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ENGINEER-IN-CHIEF'S

(INDIA)

PAMPHLET No. 10.

1943.

Notes on the Organization of that Part of the Corps
of Indian Engineers under the E.-in-C.

G.H.Q., INDIA.
1 Nov., 1943.

PREFACE.

Changes in establishments, and in types and scales of issue of equipment, are necessary from time to time and many of the details given in this pamphlet will soon be out of date.

W.E. on which organised, and relevant W.E.T., including amendments thereto, must be consulted in the case of field units and formations.

Peace Establishment, and Section of Equipment Regs. (India), Part 2 applicable, together with any amendments or War Department letters modifying them, must be consulted in the case of training establishments, etc.

These Notes constitute no authority for demanding personnel or equipment.

1 Nov. 43.

Engineer-in-Chief's Branch (E. 1-org.)

G.H.Q. (I).

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1. HISTORICAL NOTES.

(a) Formation of the Corps of Indian Engineers.

Sappers and Miners came into existence at the end of the 18th and beginning of 19th centuries as part of the armies in the three Presidencies of Madras, Bengal and Bombay. Engineer officers in the three Presidencies became R.E. after the Government of India was taken over from the East India Company by the Crown, but Sappers and Miners continued as three separate Corps.

In 1931, the first Indian trained at R.M.A., Woolwich and S.M.E. was granted a King's Commission in Indian Army (I.U.L.), and was followed later by others trained in England. In 1932, it was decided that a proportion of the Indian Cadets trained at I.M.A., Dehra-Dun should receive Engineer Commissions and that they should be commissioned into a new Corps known as the "Corps of Indian Engineers." The Indian Officers trained in England became the first officers of this new Corps. To avoid confusion between these Indian Officers with King's Commissions and existing Indian Officers commissioned from the ranks by the Viceroy, the latter became known as V.C.O's.

From 1932 also, Sappers began to be enrolled into the Indian Engineers instead of into their Sapper and Miner Corps.

(b) Expansion of the I.E.

Expansion for the War which began in 1939 started initially in the Sapper and Miner Corps, and such units as a Workshop and Park Company and a Railway Construction Company were raised by Sappers and Miners. It was realised in 1940 that it would be difficult for the three S. and M. Corps to compete with the whole production of the many and various types of Engineer Units which would be required by the rapidly expanding Indian Army. Expansion of S. & M. was already considerable for production of existing types of units and recourse was had to the Civilian labour market for the raising of both Technical and non-technical Corps and Army Engineer Units, including Transportation units. Various Engineer Depots were formed to raise the new types of I.E. units:—

No. 1 for E. & M. Coys., Workshops and Stores units.

No. 2 for Railway units.

No. 3 for Artizan Works Coys. and Heavy Bridging Coys.

No. 4 for Pioneer Bns.

No. 5 for Docks and I.W.T. units.

No. 6 for Excavating Machinery units.

(c) Reorganization of Corps of I.E. into Groups.

I.A.O. 1798/41 introduced the nomenclature of "Group" for the various categories of Indian Engineers. Since then, the S. & M. have ceased to be known as S. & M. Corps, but as "S. & M. Groups

of Indian Engineers," and personnel of these Groups have ceased to wear "S. & M." shoulder titles, but merely "I.E." in common with the rest of the Indian Engineers.

Transportation units, which originally were formed under the Engineer-in-Chief, had meantime passed under the control of the Quarter-Master General, and the original Nos. 2 and 5 Engineer Depots had been redesignated as Nos. 2 and 1 Transportation Training Centres respectively.

Owing to the confusion which resulted when Labour Battalions raised by Q.M.G. were re-designated Auxiliary Pioneer Bns., the Bns. based on No. 4 Group I.E. were re-designated "Engineer Battalions" in 1942, and the Group became known as No. 4 Engineer Group," and the men of that Group became "Sappers" instead of Pioneers."

(d) **Main Changes in W.E. and W.E.T.**

(i) *W.E.* Prior to 1942, there were different War Establishments for I.E. units in M.T. Divs. and for those working with Divs. on an animal transport basis. Consequent on decision that Class 1 equipment mules would cease to be available for S. & M. it was agreed that when I.E. units had to operate on an animal transport basis that the necessary mules and drivers would be attached from R.I.A.S.C. It was also decided in 1942 that in future only the I.E. units in Armd. Divs. would be fully mechanised, and that all others would include a marching element. These changes made possible standard war establishments for Divisional units I.E. which do not have to be altered according to the transport basis of the division with which they may be employed.

Further changes have been effected during 1943 due to the general Army policy of reducing the numbers of followers in units and replacing them by combatants as far as practicable. Changes were also necessary due to the General Staff policy of substituting 15 cwt. 4 by 4 trucks for 3 ton lorries in most Divs.

(ii) *W.E.T.* Scales of War equipment were reviewed in 1942, to cut out non-essential items and reduce the total weight to be carried especially in forward units. The War Equipment Table is standard for each type of I.E. unit and is designed to be a good average of essential general requirements. See further notes in Sec. 60.

2. COMPOSITION OF THE I.E.

There are three main Branches of the Indian Engineers controlled respectively by the Engineer-in-Chief's, the Quarter-Master General's, and General Staff Branches of G.H.Q. (I).

(a) Under the Engineer-in-Chief:—

(i) E.-in-C's Branch of G.H.Q.

(ii) Engineer Staffs in Armies/Commands/Forces.

(iii) Q.V.O. Madras S. & M., Group I.E.

- (iv) K.G.V's.O. Bengal S. & M., Group I.E.
- (v) Royal Bombay S. & M., Group I.E.
- (vi) No. 1 Electrical and Mechanical, Group I.E.
- (vii) No. 3 Construction Group I.E.
- (viii) No. 4 Engineer Group.
- (ix) No. 6 Mechanical Excavating Group.
- (x) The Military Engineer Services.
- (xi) "H" Coy. R.E.

(b) Under the Quarter-Master General, there are :—

- (i) The Transportation Directorate (Q-8).
- (ii) Docks and I.W.T. Group I.E.
- (iii) Railway Group I.E.

(c) Under the General Staff :—

- (i) The Survey Directorate (Geographical Section, General Staff).
- (ii) The Survey Group I.E.

(d) No further reference is made in this pamphlet to branches of the Indian Engineers under the control of the Q.M.G's Branch (Q-8) and G.S. Branch (G.S.).

The different types of units formed by those groups under the E.-in-C. are listed in Section 21.

3. OFFICERS.

There are various categories of Officers serving with the Indian Engineers.

(a) Officers of the Corps of Royal Engineers.

- (i) Regular and Emergency Commissioned whether granted direct commission or after training at O.C.T.U.
- (ii) I.R.E.M.
- (iii) Surveyor of Works.
- (iv) Supplementary Reserve of Officers.
- (v) Regular Army Reserve of Officers.
- (vi) Territorial Army and Territorial Army Reserve of Officers.
- (vii) Indian Regular Reserve of Officers.

† (ii) and (iii) above also contain Emergency Commissioned officers.

(b) Officers of the Corps of Indian Engineers.

- (i) Regular (either trained at Chatham, or at I.M.A. Dehra Dun before 1940).
- (ii) Those granted direct Emergency Commissions.
- (iii) Those granted Emergency Commissions after training at an Officer Cadet Training Unit in India.

(c) Departmental Officers of the India Unattached List.

Divided into Buildings and Roads Branch, Electrical and

Mechanical Branch or Furniture and Stores Branch holding either permanent commissions or temporary (War Emergency) commissions.

(d) Civilian Gazetted Officers

Either belonging to the permanent Assistant Engineer or Surveyors of Works grade, or recruited as temporary engineers in the U.K. or India.

4. BRITISH W.O's, & N.C.O's.

(a) There are two main categories serving with the Indian Engineers:—

- (i) W.O's. and N.C.O's. of the Royal Engineers.
- (ii) W.O's. and N.C.O's. of the I.U.L. (I.E.)

(b) Royal Engineers.

(i) R.E. N.C.O's. are included in the establishment of most I.E. units. These N.C.O's. are intended primarily to assist units in trades and field engineering. A small number of Military Mechanists and Military Foremen of Works also serve as S.D.O's. in the "M.E.S." Conditions of Service are laid down in R.E. Conditions of Service (India) Reprint 1941.

All R.E. W.O's. and N.C.O's. serving with I.E. are borne on the strength of 'H' Coy. R.E. They are of one or other of the categories shown in (ii) and (iii) following:—

(ii) *N.C.O's. from Sapper and Driver Rosters:* These N.C.O's. are brought to India for service in H.Qrs. of I.E. Groups and units dependent on such Groups. While serving with I.E. they receive "S. & M." promotion under conditions laid down in G.H.Q. (I) letter No. B/57776/6/A.G.4(a) dated 13-1-42, as amended. They comprise all types of tradesmen.

(iii) *W.O's. & N.C.O's. from E. for E.S. or T./E. for E.S. Rosters:* These W.O's. and N.C.O's. are brought to India for service in H.Qrs. of certain I.E. Groups and units dependent on such Groups and also for service with the M.E.S. While serving with I.E. they receive R.E. promotion under normal rules. They comprise:—

Military Foremen of Works.

Military Mechanists.

Engineer Clerks.

Engineer Draughtsmen.

Surveyor Clerks.

They can only be employed in authorised vacancies for E. for E.S. or T./E. for E.S. personnel.

(c) Indian Engineers.

W.O's. and N.C.O's. serving in the I.U.L. (I.E.) or T./I.U.L. (I.E.) are drawn from all arms of the service. They can be posted to fill S.D.O. (Military) vacancies both in I.E. units and formations and in the M.E.S.

They comprise :—

S.D.O's. E. & M., normally drawn from R.E.

S.D.O's. B. & R., „ „ „ „

S.D.O's. F. & S., normally drawn from other arms.

Of these W.O's. and N.C.O's., only those transferred to the I.U.L. (I.E.) from the Royal Engineers are borne on the strength of 'H' Coy. R.E. and this only while they are N.C.O's. Once permanent Warrant rank in the I.U.L. (I.E.) has been attained, they are struck off the strength of 'H' Coy. R.E.

(d) 'H' Company R.E.

(i) Every R.E. soldier posted to India for Service with an Indian unit or formation (other than Transportation or Survey units) is brought on the strength of 'H' Coy. R.E. This is a purely administrative unit commanded by a staff officer of the E.-in-C's. Branch, G.H.Q. (I). 'H' Coy. R.E. maintains no pay accounts nor equipment ledgers. All accounts of personnel of 'H' Coy. are kept by Chief Paymaster, British Troops, MEERUT. 'H' Coy. R.E. is divided into :—

(ii) Three detachments at the Headquarters of the three Sapper and Miner Groups I.E. (Bangalore, Roorkee and Kirkee) under the Commandant. The Officers Commanding these detachments communicate directly with the Officer i/c R.E. Records (Brighton) on routine matters connected with their detachment.

(iii) Detachment 'H' Company R.E. G.H.Q. (I). This detachment comprises all R.E. soldiers on the roll of 'H' Coy. R.E. not posted to one of the detachments in (ii) above, and is under the direct control of O.C. 'H' Coy. R.E.

5. V.C.O's. and I.O.R's.

(a) Prior to 1932, each S. & M. Group was responsible for its own recruiting. All that was necessary when recruits were required was to send out post-cards to men who had previously come to Group Headquarters at their own expense to be examined and have their names noted on the waiting list of volunteers, for enrolment. Every man put on the waiting list was vouched for by some relative or connection already serving in the Corps. In 1932 orders were issued that all recruiting for S. & M. in future must be done through Recruiting Officers controlled by Adjutant General's Branch.

All men were initially enrolled as "Sappers" and promotion to N.C.O. and V.C.O. was obtained by Sappers selected after good service.

(b) Boys Battalions were formed in each S. & M. Group in 1941 and after a normal training period of 18 months Boys are re-mustered as Sappers. Such Sappers are all well educated, good tradesmen, and form a good nucleus from which many N.C.O's. and V.C.O's. are likely to be obtained.

(c) In 1942, in order to endeavour to overcome the acute shortage of clerks, orders were issued by A.G's. Branch that all clerks would in future be enlisted in the rank of "Havildar." In this year also a few men were enrolled directly as V.C.O's. and N.C.O's. in order to try to meet the very great demands of the expanding Indian Engineers.

(d) Indian classes recruited vary with the different Groups as shown below :

(i) *MADRAS S. & M.*: Madrassi classes. These include Tamil, Telugu and Malayahan speakers and Hindus, Mussulmans and Christians. All eat similar food and no class distinctions are made in Madras S. & M., all personnel working and feeding together.

(ii) *BENGAL S. & M.*: Three main classes only are enlisted :

Mussalman—Punjabi Mussalmans, Pathans and Meos.

Hindus—of Brahmin and Chathri classes from the districts of Garhwal, Almora, Ghazipur and Oudh.

Sikhs—nearly all of whom are Jats. Mazbi and Ramdasia classes are not taken in this Group.

(iii) *BOMBAY S. & M.*: Three classes are enlisted :

Punjabi Mussalmans.

Mahratta Hindus.

Mazbi and Ramdasia Sikhs.

(iv) *No. 1 Group and No. 3 Group*: These Groups take recruits of all classes, including Hindus, Mussalmans, Sikhs, Madrassis and Christians.

(v) *No. 4 Group*: Units of this Group are composed of men of the following classes :

Madrassis, Mahrastra Classes including Mahrattas and Mahars, Shilpkars, Punjabi Mussalmans, Mazbi and Ramdasia Sikhs, Pathans and Meos.

(vi) *No. 6 Group*: Most of the personnel of this Group are of similar classes to those in Bengal S. & M., but the Group also includes a few Madrassis.

6. MILITARY ENGINEER SERVICES.

(a) Functions.

The Military Engineer Services under the control of the E.-in-C. are responsible for the construction and maintenance of buildings, defence works and airfields, together with the accessory services such as roads, E/M services, water supply, drainage, ranges, furniture, etc., and also the internal fixtures required by the Naval Army and Air Forces.

The normal method of execution of works in India is by Contract and for this officers down to the appointment of Garrison Engineers are given certain powers of acceptance of contracts. These powers are laid down in M.E.S. Regulations, Table B.

In certain cases work may be carried out by labour directly supervised by M.E.S. Staffs. This is the normal method in operational areas where mobilized Ind. C.R.E. Works and Ind. Works Sections carry out work with military transport and military labour, supplemented by local labour when available.

(b) Composition.

(i) Officers in the M.E.S. may be of any of the categories given in Sec. 3. Subordinate personnel are mostly Civilians though a few of the senior subordinate ranks may be held by Military personnel as stated in Sec. 4 (b) and (c). Civilian subordinates may be British, Indian or Anglo-Indian and of any religious class.

(ii) The classes and grades of civilian subordinate personnel are as follows:

S.D.O's., E/M, B/R and F/S.

Surveyors Assistants, Grades I and II.

Overseers B/R.

Superintendents E/M.

Supervisors F/S.

Clerks, Upper and Lower Divisions.

Storekeepers, Upper and Lower Divisions.

Draughtsmen, Architectural, Upper and Lower Divisions.

S.D.O's. of the three branches, and S.A's. Grade I, may be either military or civilian personnel.

C.E's. are vested with full powers, subject to financial rules and Civil Service Regs., to appoint, administer and control all civilian subordinate personnel in the M.E.S., except that permanent Civilian S.D.O's. and S.A's. are appointed by the E.-in-C.

(c) Categories of Subordinate Personnel.

- (i) Permanent pensionable personnel.
- (ii) Personnel holding substantive temporary posts.
- (iii) Personnel holding temporary war appointments.
- (iv) Temporary (casual) personnel required for specific works.

Both the permanent pensionable and substantive temporary establishments are authorised by the Government of India by classes and grades on an all-India basis. They are subdivided by the E.-in-C., G.H.Q., and allotted to each static C.E. in India as the establishment under his administrative control.

Temporary war appointments are sanctioned by the C.E. or other M.E.S. authority under the powers vested in them, to meet local requirements from time to time in connection with special work directly connected with the war.

Temporary (casual) personnel are engaged on the basis of monthly or daily payment for the particular work to which their pay is charged. Their employment is normally limited to the duration of the work.

Tradesmen such as charge mechanics, charge electricians, instrument mechanics, wiremen, fitters, armature winders, linesmen, drivers (I.C. steam and roller) etc. are also employed in the M.E.S. These classes are treated as temporary (casual) employees.

(d) Conditions of Service of Civilian Subordinates.

All civilian subordinate personnel, whether permanent or temporary (excluding casual employees) are normally required, on appointment to the M.E.S., to execute an agreement which renders them liable for general service including field service in or out of India and precludes them from resigning the service without permission during a war emergency.

Whilst employed in the M.E.S. all civilian subordinate personnel are subject to military law for purposes of discipline.

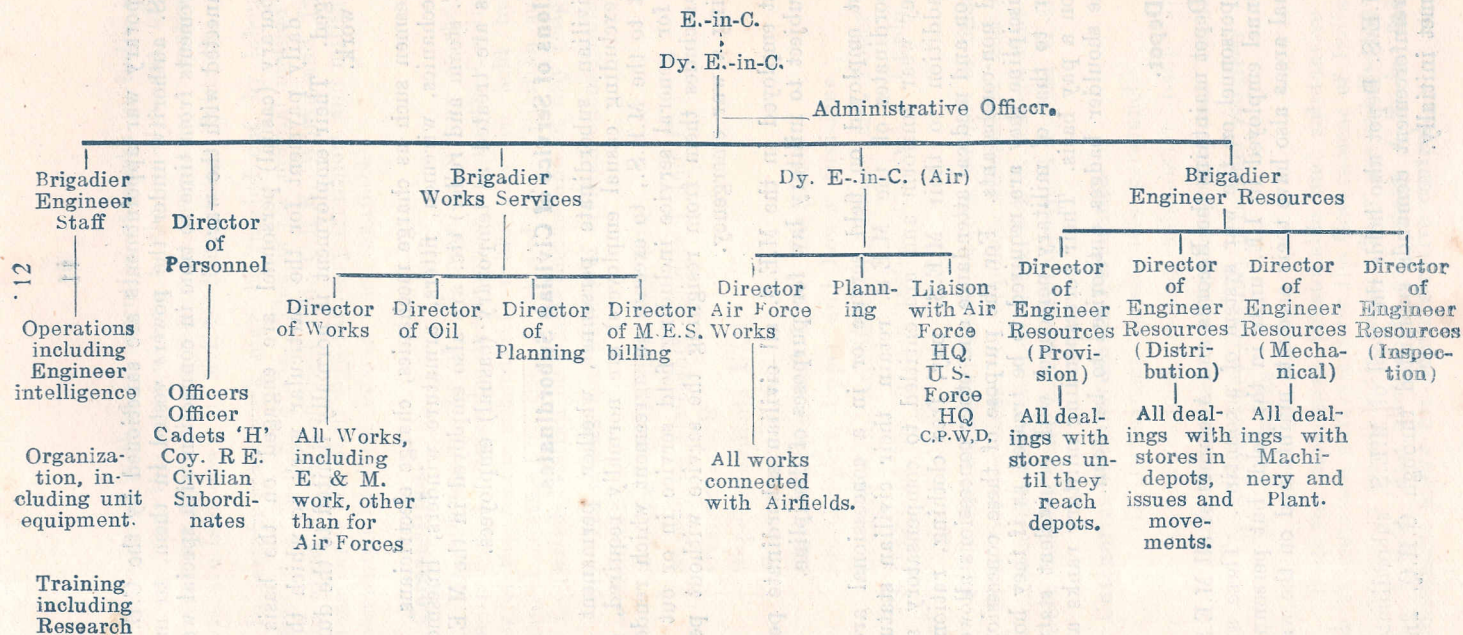
Whilst employed on field service or in a concessional area civilian subordinates of the M.E.S. retain their civilian status. However, they wear uniform and are entitled to compensatory allowance in addition to their M.E.S. pay, free clothing, rations, accommodation and medical attendance and other concessions allowed to unenrolled non-combatants. For the purpose of these concessions as well as discipline they are required to be treated as if they hold rank similar to that of military personnel with equivalent status determined on a pay basis. Their corresponding military ranks are shown on the shoulder badges authorised to be worn.

(e) M.E.S. Depot.

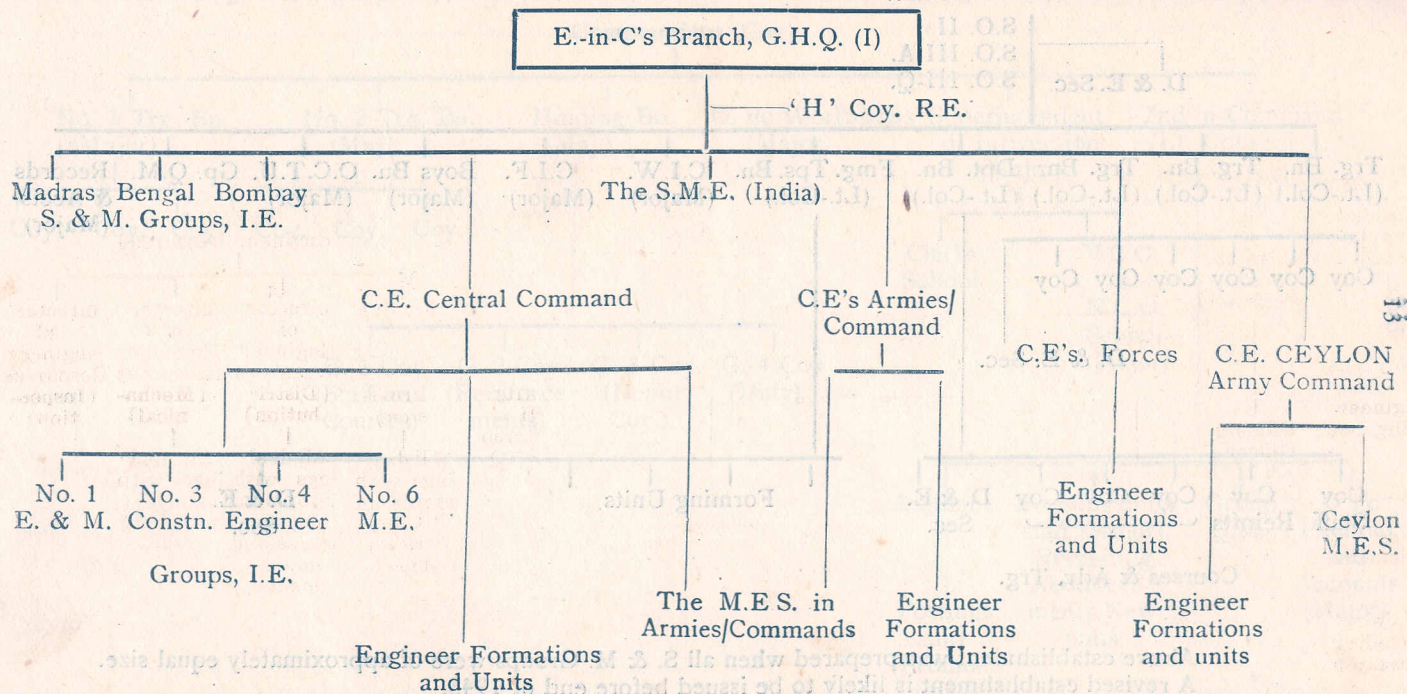
This Depot maintains the Records and Accounts of all M.E.S. subordinate personnel on the war system of accounting. These are mostly personnel employed in I.E. units in the field, but personnel in concessional areas also have their accounts maintained on the war system.

The M.E.S. Depot also holds the Pool of M.E.S. subordinates from which reinforcement demands submitted through G.H.Q. 2nd Echelon are met initially.

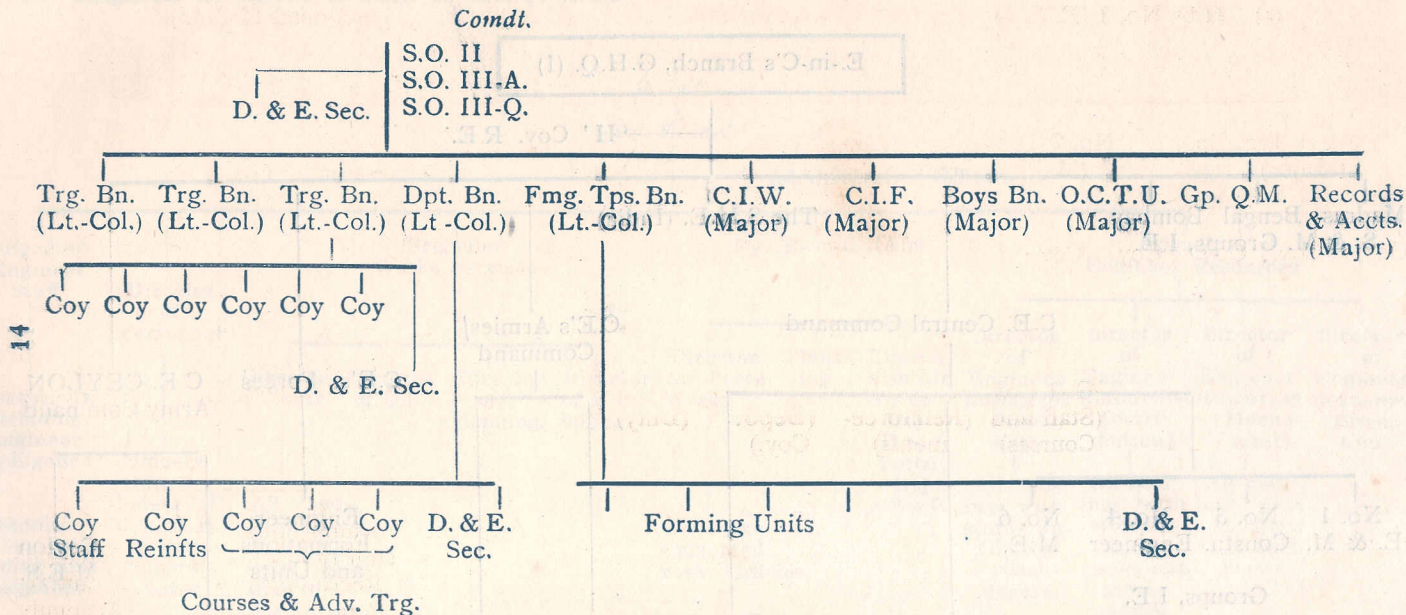
7. Engineer-in-Chief's Branch of G.H.Q. India.



8. Control by E.-in-C, over various components of the I.E.



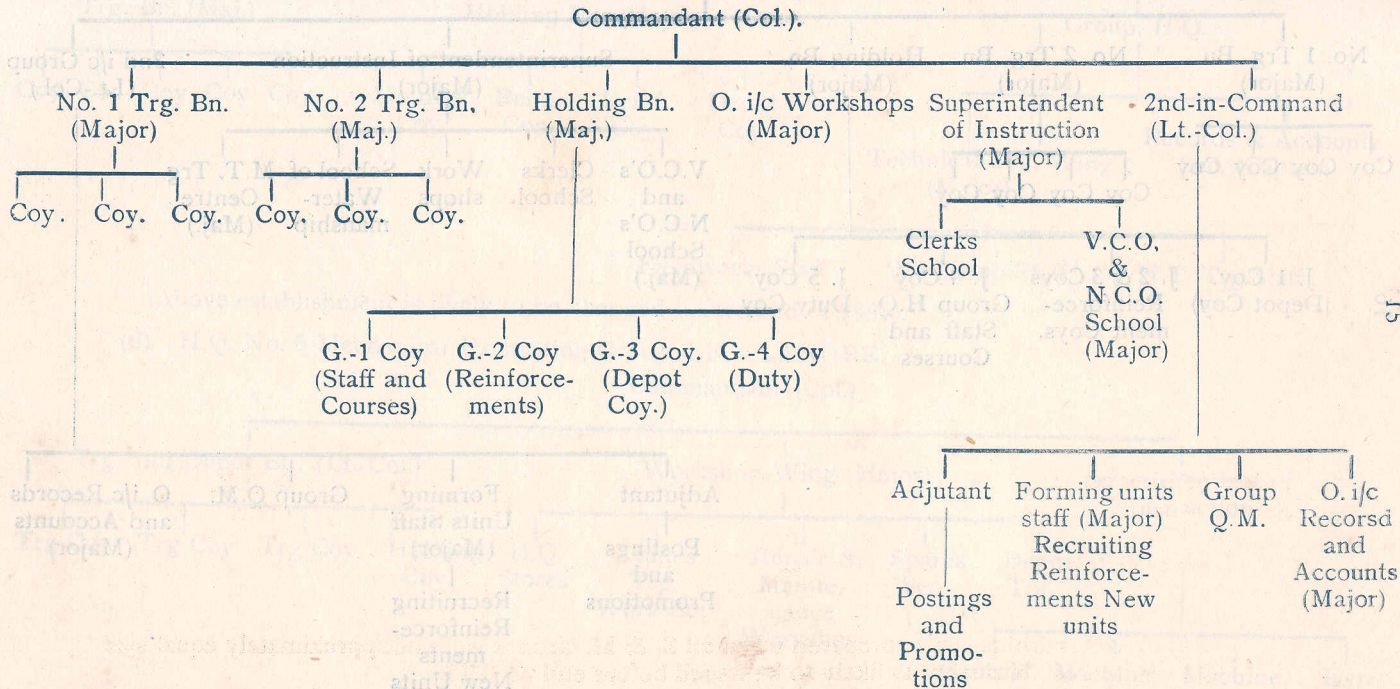
11. (a) Existing Organization S. & M. Gp. H.Q. —Oct. 43.



Above establishment was prepared when all S. & M. Groups were of approximately equal size. A revised establishment is likely to be issued before end of 1943.

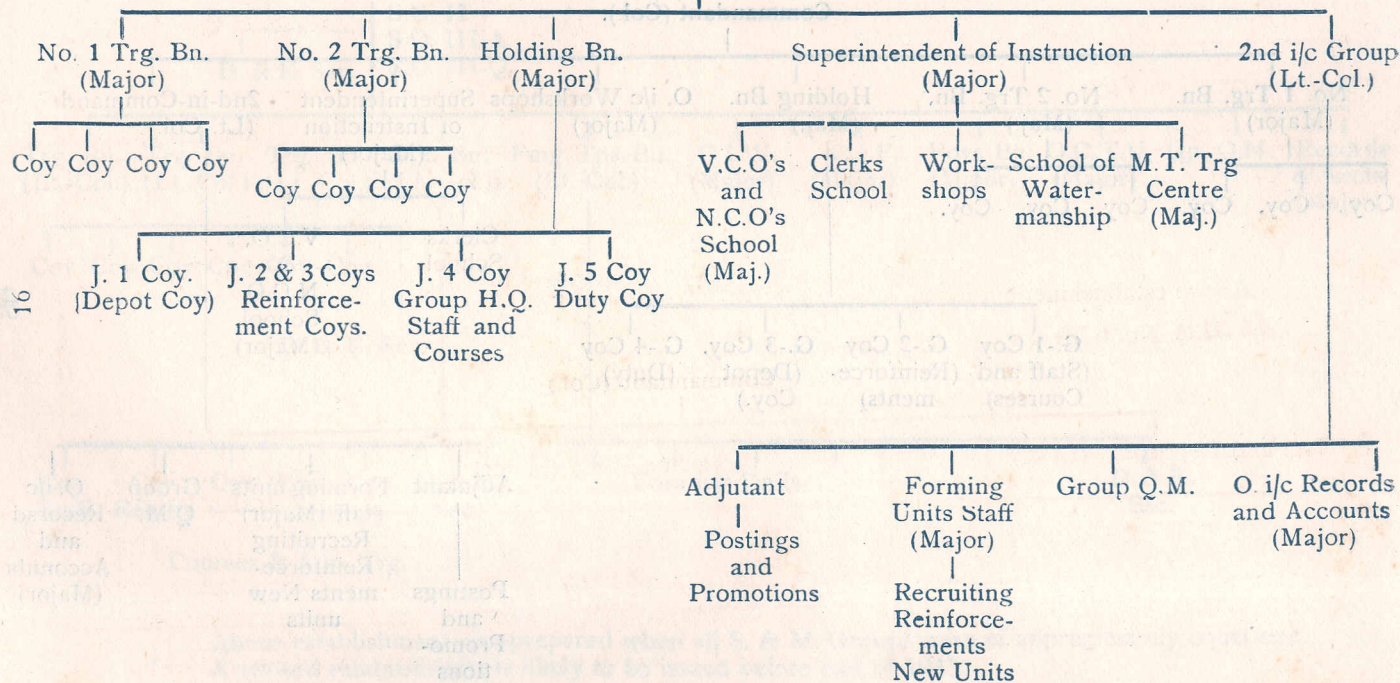
12. H.Q. Nos. 1, 3, 4 and 6 Groups, I.E. - LAHORE. (Establishment sanctioned 12-8-43).

(a) H.Q. No. 1 (E. & M.) Group, I.E. - LAHORE. (Establishment sanctioned 12-8-43).

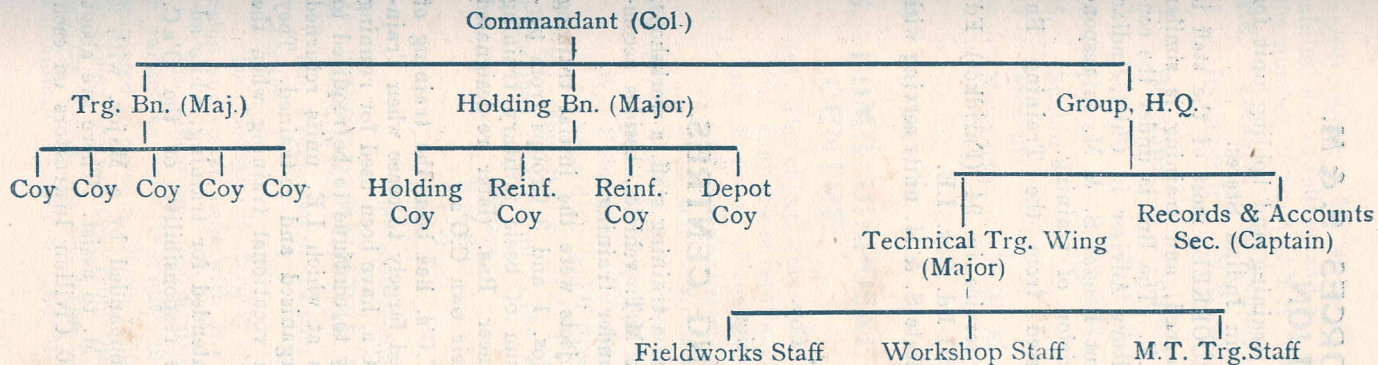


(b) H.Q. No. 3 (Construction) Group, I.E. - LAHORE. (Establishment sanctioned 12-8-43).

Commandant (Col.)

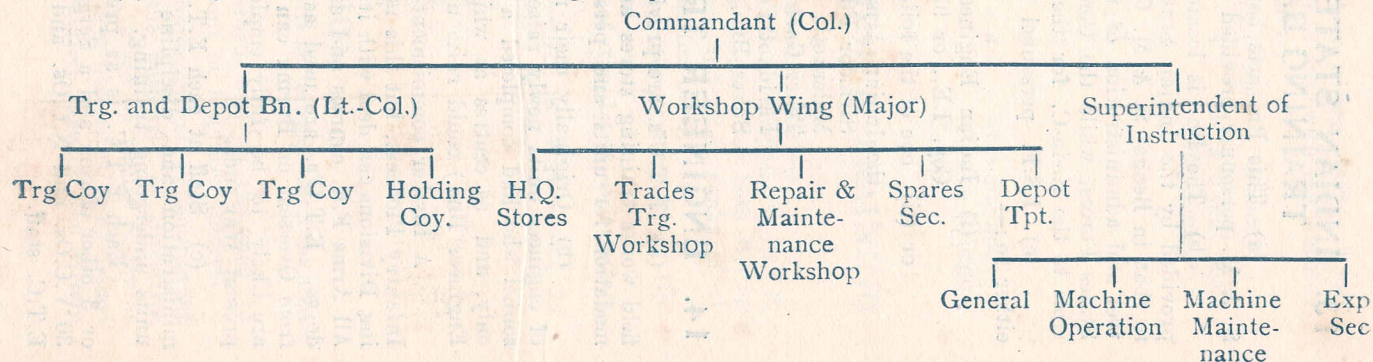


(c) H.Q. No. 4 Engineer Group, I.E. - SIALKOT.



(Above establishment is likely to be changed before end of 1943).

(d) H.Q. No. 6 Mechanical Excavating Group, I.E. - LAHORE.



13. INDIAN STATES FORCES S. & M. TRAINING BATTALION.

(a) This Bn. acts both as a training and holding unit for S. & M. personnel provided by certain Indian States.

(b) The Bn. is located at ROORKEE, most of the staff is provided by the Indian States concerned, and training is similar to that in Bengal S. & M. Group I.E. The Bn. is under the control and administration of the Military Adviser in Chief, Indian States Forces, while the Commandant Bengal S. & M. is responsible to the E.-in-C. for the supervision of training.

(c) I.S.F. personnel are posted from the Training Bn. either to :—

(i) Indian Engineers for service in 94 (Faridkot) Fd. Coy. I.E., or 95 (Mandi) Fd. Coy. I.E.

or (ii) one of the following State S. & M. units serving with the Indian Army :—

Sirmoor Fd. Coy.

Malerkotla Fd. Coy.

Tehri Garhwal Fd. Coy.

Faridkot Fd. Coy.

Suket Bridging Section.

14. ENGINEER TRAINING CENTRES.

(a) E.T.C's. are provided with a training staff, a workshops, field works training stores and some M.T. vehicles, besides accommodation for units and personnel under training.

(b) Originally their main objects were the initial training of engineer units newly raised by Nos. 1 and 3 Groups from personnel who had completed a minimum of basic military training only, and as centres at which Pioneer Bns. (later re-designated Engineer Bns.) could raise under their own C.O's.

A further commitment of E.T.C's. has been the training of Infantry Pioneers, but this is expected largely to cease when Training Divisions can deal with it. E.T.C's. have been used for running All Arms F.E. courses and are likely to continue to be required to do so. E.T.C's. are used as centres at which I.E. units returned from Overseas or Burma can be reorganised and re-trained. They are likely to be fully employed on vocational training when the present War ends.

(c) Staff at each E.T.C. is intended for training, while administration and discipline are the responsibility of the O's.C. units undergoing training.

Each E.T.C. is at present commanded by a Major, with 2 or 3 other officers and a Sergt. S. & M. to assist. There are about 30 V.C.Os. and N.C.Os. and over 30 Civilian Instructors on each E.T.C. staff.

(d) Some E.T.C's. have already been closed down. Those remaining are as follows and are organised to deal with the training of the number of units of Coy. size as shown:

E.T.C.	Location.	Command/Army.	No. of units.	Remarks.
11	Rawalpindi	N.W. Army	4	Has 6-unit scale of Equipment.
12	Begumpet	Southern Army	4	
13	Quetta	N.W. Army	4	
14	Jhansi	Central Comd.	4	
15	Sialkot	" "	4	
17	Meerut	" "	4	
19	Nowshera	N.W. Army	4	Also includes Akhora Bridging Camp.
20	Kohat	"	4	

15. BOMB DISPOSAL SCHOOL & TRAINING CENTRE.

(a) The objects for which this exists are the:—

- (i) Training of reinforcements for Bomb Disposal Units I.E.
- (ii) Running of courses in bomb disposal for both British and Indian personnel, officers and other ranks of all Arms and Services, as well as for Civilians.
- (iii) Control and direction of the Inter Services Bomb Disposal Development Committee.
- (iv) Publication for the Army of the latest information regarding bomb disposal.

(b) The B.D.S. and T.C. is located at Kirkee and the Commandant is a Major. The staff consists of:—

Officers	5
B.O.R.s	2
V.C.O.s	3
I.O.R.s	45
Non-Combatants	23

16. EXPERIMENTAL SECTION.

The Experimental Section is a G.H.Q. organisation located at Roorkee.

The Section is largely self-contained and is designed to develop and experiment with any equipment of Engineer interest.

Simplification, modification, or improvement of equipment for particular roles is undertaken on the authority of directives formulated to cover a known requirement, based on future policy or past experience reported from the field, these directives being issued from the E-in-C to the Experimental Section through the Group Commandant, Bengal S. and M.

17. SCHOOL OF MILITARY ENGINEERING (India)

- (a) Being first established in October, 1943, its final constitution is uncertain.
- (b) Organised around the Thomason College of Civil Engineering, Roorkee, by arrangement with the Government of the U.P. It will consist of a Military Training Wing and a Technical Training Wing.
- (c) The civilian output from the College for the U.P. P.W.D. will be maintained by the existing Staff working under the control of the Commandant S.M.E. and his Staff.
- (d) The technical training facilities of the College will also be used to provide instruction for young Officers for M.E.S. S.D.O.s and Overseers B. and R. Branch, S.D.O.s and Superintendents E. and M. Branch, S.D.O.s F. and S. Branch, and for M.E.S. Surveyors, Assistants and Draughtsmen. Personnel in these various categories will study under a special civilian instructional staff. The training of M.E.S. Clerks may also be included and the whole will form the Technical Training Wing.
- (e) The Military Wing will :—
 - (i) run special courses previously undertaken by H.Q. I.E. Groups, e.g. courses for C.s.R.E.
 - (ii) give refresher instruction to officers and B.O.R.s in certain selected subjects.
 - (iii) run courses for personnel (British and Indian) to be used as Instructors in Engineer training establishments.

(A separate pamphlet will be issued by end of 1943 describing in full the S.M.E. and the scope of its training).

18. OBSTACLE ASSAULT CENTRE (India)

- (a) The E-in-C India will take over responsibility for all experimental work in connection with the overcoming of obstacles likely to be met with in Far Eastern theatres of operations.
- (b) This Centre has accordingly been established with the following terms of reference :—
 - (i) To develop a technique for :—
the passage of A/Tk. and A/Pers. minefields, and the surmounting of obstacles
— and —
the assault on defended posts as used by the Japanese in Eastern theatres of war.

- (ii) To advise the General Staff on the tactical implications of the technique.
- (iii) To develop the special assault equipment considered necessary to implement this technique and to produce detailed descriptions of it so that production may be arranged to meet General Staff requirements.
- (c) The Establishment of the Centre will contain both Engineer and Armoured Corps personnel.

21. I.E. UNITS.

Units of the Corps of Indian Engineers of the following types are under control of the Engineer-in-Chief. War Establishments shown are those applicable on 1 Nov 43.

I.E. GROUPS. TYPE OF UNITS. WAR ESTABLISHMENT.

S & M Groups	HQ Ind Armd Div Engrs	1/102/1
	Ind Field Sqns	1/139/1(Amdt No. 1)
	Ind Field Pk Sqn	1/140/1(Amdt No. 1)
	HQ Ind Div Engrs	1/3/6 (Amdt No. 1)
	Ind Field Coys	1/22-A/2(„ 1, 2, 3)
	Ind Field Pk Coys	1/20-A/2(„ 1, 2, 3)
	Ind Field Coy (Light)	* 161/1942(Annex 469)
	Ind Field Pk Coy (Light)	* 162/1942(Annex 470)
	Ind Bridging Secs	1/21/2 (Amdt 1,2,3)
	Ind Para Sqn	II/82/2
	Ind Army Tps Coys	II/25/4
	Indpt Field Secs	Col. 3 of W.E.I/20-A/2 (as amended)
	Indpt Field Stores Secs	Col. 4 of W.E. I/20-A/2 (as amended)
	HQ Ind Corps Tps Engrs	II/9/4(Amdt Nos 1,2,3)
	HQ Ind Forward Airfield Engrs	1/3/6 (Amdt No. 1)
	HQ Ind Army/L of C Tps Engrs	II/30/2
	Ind Eng Bns	* III/67/5(Amdt 1,2,3)
	Ind Quarrying Coys	II/27-B/1
	HQ Ind Bridge Coys	} As for No. 3 Group } Bridge units.
	Ind Bridge Secs	
	HQ Ind Mech Recn Engrs	* II/28-A/1 (Amdt No. 1)
	Ind Mech Recn Coys	* II/28/3 (Amdt No. 1)
	Ind Pipeline Optg Coy	127/1943 (Annex 1038)
	Ind Print Secs	II/26/4
	Ind Road Roller Secs	II/27-C/1
	Ind Fd Broadcasting units	II/26-B/1
	Ind Special Secs	184/1934 (Annex 1146)

No. 1 E & M Group	Ind E & M Coys	II/28/4
	Ind Wkshop & Pk Coys	II/24/2 (Amdts 1,2)
	Ind Well Boring Secs	II/27-A/1
	Ind E.S.B. D.	VI/74/1 (Amdts 1,2)
	Ind Eng Base Wkshop	II/30-A/1 (Amdt 1)
	Ind SWK Erec Secs	VI/73/1
	Ind Quarrying Coys	As for S & M Quarrying Coy
	Ind S.E.R. Secs Type A	92/1942 (Annex 362)
	Type B	93/1942 (Annex 363)
	Road Roller Secs	II/27-C/1
No. 3 (Constn) Group	Ind Docks Stores Secs	II/26-A/1
	Ind Oxy Acet Gen Units	198/1942 (Annex 521)
	Ind CE/DCE Wks	23/1942 (Annex 251)
	HQ Ind CRE Wks	II/30-B/2 (Amdt 1)
	Ind Wks Secs	II/30-C/1 (Amdt 1)
	Ind A.W. Coys	II/27/4 (Admt 1)
	HQ Ind Br Coys	II/24-A/2 (Annex 1191)
	Ind Bridge Secs (...)	II/24-B/1 (Annex 1192)
	HQ Ind B.D. Coy	II/29/3
	Ind B.D. Secs	II/29-A/1
No. 4 Engineer Group	Ind Forestry Coy	II/32-B/2
	Ind Ropeways Sec	Prov W.E 55/1943 (Amdt 1) Annex 839
No. 6 (M.E.) Group	Ind Eng Brs	III/67/5 (Admts 1,2,3)
	HQ Ind M.E. Engrs	* 229/1942 (Annex 562)
No. 6 (M.E.) Group	Ind M.E. Wkshop & Pk Coy	232/1942 (Annex 565)
	HQ Ind M.E. Coy	230/1942 (Amdt 1) (Annex 563)
	Ind M.E. Secs.	231/1942 (Amdt 1) (Annex 564)

(For summarised details of above W.E's, see Table "A")

* W.E under revision

22. R.E. UNITS.

Units of the Corps of Royal Engineers for which the Engineer-in-Chief in INDIA is responsible :—

HQ Div R.E.	II/118/1
Field Coys R.E.	II/194/1
Field Pk Coys R.E.	II/201/1
HQ-GREF Tps R.E.	III/14/4
Special Secs R.E.	Prov Ind W.E. 183/1943 (Annex 1145)
HQ M.E. Coys R.E.	IV/22 C/3
M.E. Secs R.E.	IV/124/—
Anti Gas Lab R.E.	Sp. W.E 221/1943.

31. INDIAN ARMoured DIVISIONAL ENGINEERS (1nd Armd Div Engrs)

(a) Organization.

Ind Armd Div Engrs includes two Ind Fd Sqns, and one Ind Fd Pk Sqn, all Div Tps. One Ind Bridge Section (Bailey Bridge) may be attached as a non-Div unit.

(b) Characteristics.

Fully motorised, and a proportion of armoured vehicles is included both for recce and for carriage of personnel.

(c) Detail.

H.Q. Ind Armd Div Engrs C.R.E. and Staff is included in W.E. of H.Q. Armd Div, and officer establishment consists of C.R.E., Adjt., I.O. and one Fd Engineer.

Ind Fd Sqn H.Q. and three Fd Tps (equal). Sqn H.Q. includes an Officer for liaison duties, and an extra B.N.C.O., but otherwise personnel establishment of the unit is generally similar to an Ind Fd Coy except that the proportion of drivers is higher. Equipment is similar to that of the Fd Coy but a rather larger scale is carried and in addition the Fd Sqn carries a small scale of No. 75 (Hawkins) grenades for use as anti-tank mines.

Ind Fd Pk Sqn H.Q., Br Tp, Workshop and Stores Tp. Mech Exc Tp.

The Bridging Troop carries the same scale of bridging equipment as the Ind Bridging Sec in an Inf Div except for the S.B.G. eqpt. and its vehicles. In place of the S.B.G. eqpt. it is normal for an Ind Bridge Sec (Bailey Bridge) to be attached to the Ind Armd Div Engrs.

The Workshop and Stores Troop carries a scale of over 2000 No. 75 (Hawkins) grenades for use as Anti-Tank mines, but otherwise is generally similar to the corresponding sub unit in the Fd Pk Coy. The Mechanical Excavating Troop is designed to operate four tractors fitted with angle-dozers.

(d) Ind Fd Sqn, identical with that in an Armoured Div is included in each Ind Tank Bde. It is assumed that an Ind Tk Bde will normally be operating with an Infantry Div and therefore no separate bridging unit with light bridging equipment is included in the Ind Tk Bde. When Ind Tk Bde is equipped with A.F.V. over class 24 loads it will be normal to attach an Ind Br Sec carrying 130ft. D.D. Bailey Bridge in addition.

32. INDIAN LIGHT DIVISIONAL ENGINEERS—(Ind Lt Div Engrs)

(a) Organization.

Ind Light Div Engrs includes two Ind Lt Fd Coys, and one Ind Lt Fd Pk Coy.

(b) Characteristics.

Transport is provided for recce and for carriage of eqpt., but it is intended that bulk of the personnel will normally march. For recce, Jeeps and armoured scout cars are authorised. Normal transport for Fd Coy eqpt., and for the bridging eqpt. carried in the Lt Fd Pk Coy, is 15-cwt 4 wheel drive trucks, but R.I.A.S.C. Jeep and mule transport may be allotted to enable a Bde to take eqpt of two Secs of Lt Fd Coy plus water supply stores in Jeeps or on pack.

(c) Detail.

H.Q. Ind Lt Div Engrs. C.R.E. and Staff forms part of H.Q. Light Div. There is an Adj., Intelligence Officer and one Field Engineer.

Ind Lt Fd Coy. H.Q. and three Secs (equal). Coy H.Q. includes a Field Engineer additional to the officers and British other ranks as in the normal Fd. Coy.

Ind Light Fd Pk Coy. H.Q., Br Sec Fd Stores Sec and Works Sec. The Bridging Sec carries recce boats, assault boats, outboard motors, and Class 5 Indian mat bridge eqpt. all on 15-cwt trucks.

33. INDIAN DIVISIONAL ENGINEERS—(Ind Div Engrs)

(a) Organization.

H.Q. Ind Div Engrs, three Ind Fd Coys, one Ind Fd Pk Coy, and one Ind Br Sec, all Div Tps.

(b) Characteristics.

M.T. is provided only for recce and for the carriage of equipment. It is intended that personnel will normally march. The C.R.E. has a small pool of transport held in the Fd Pk Coy which he can allot for the carriage of personnel of up to two Sections or for carriage of extra equipment or stores.

(c) Detail.

H.Q. Ind Div Engrs. Officers consist of C.R.E., Adj., Intelligence Officer, and two Field Engineers. H.Q. Ind Div Engrs is organised as a unit including its own vehicles and British cooks so that C.R.E. and his staff can live apart when it is not convenient to live in Divisional H.Q.

Ind Fd Coy. H.Q. and three equal Secs each intended to provide a working strength of about 45 men. Jeeps are included for recce purposes and transport for the carriage of eqpt. is normally 15-cwt. 4 by 4 trucks. One 3-ton 4 by 4 lorry is included for carriage of heavy or long loads when track and bridge conditions make its use possible and there is also a 3-ton winch lorry. There is one compressor truck.

When Ind Fd Coy is employed in a non-divisional role, two extra compressor trucks, and three 3-ton lorries for carriage of personnel or Engineer stores may be authorised.

Fd Coy carries sets of fieldworks, handyman's and tradesmen's tools, water supply and demolition equipment including explosives. Most of the equipment is packed in "Boxes mule" and other pack containers, so that it can be rapidly reloaded from unit M.T. on to attached R.I.A.S.C. mule transport when required.

Ind Fd Pk Coy. H.Q., Workshop Sec, Stores Sec, Field Sec.

H.Q. of Fd Pk Coy contains the C.R.E's. reserve of transport and two reserve compressor trucks, the Divisional reserve of tools, and additional equipment for allotment to Fd Coys when necessary.

Workshop Sec contains a high proportion of artificer tradesmen and includes a workshop lorry. A second workshop lorry is authorised for a Fd Pk Coy in a Corps role.

Stores Sec is a small unit intended to control the divisional dump of Engineer stores.

Field Sec is similar to a Section of a Field Coy, less the artificer element which, in the Fd Pk Coy, is included in the Workshop Sec. The Field Sec. also includes 3 Tractors with angle-dozers, and vehicles to transport them.

Ind Bridging Section. In a Division, this Section will normally be attached to the Fd Pk Coy but it is organised on its own W.E. so as to be capable of operating independently either with a Fd Coy or Fd Sqn with an independent Bde or in non-divisional roles.

Unit carries Recce boats, Assault boats, Outboard Motors, Folding Boat Equipment and Small Box Girder equipment. (See Sec. 62).

34. WIRELESS INTER-COMMUNICATION

(a) "N" Section Ind Div Sigs includes six Wireless sets (No. 22) and transport for providing inter-communication between C.R.E. and units of Div Engrs. It is intended that the sixth Wireless set will be available for communication between C.R.E. and a detached recce party.

(b) Each Fd Sqn and Fd Pk Sqn in Armd Formations will have three Wireless sets manned by Sapper operators. Each Fd Coy and Fd Pk Coy in Divl Engrs including units in Lt Div Engrs and Fd Coys of Forward Airfields will each have three Wireless sets manned by Sappers.

36. INDIAN CORPS TROOPS ENGINEERS— (Ind Corps Tps Engrs)

(a) Organization.

H.Q. Ind Corps Tps Engrs, three Ind Fd Coys, one Ind Fd Pk Coy and normally one Ind Bridging Sec will be allotted.

Other I.E. units normally allotted to Corps Tps Engrs are Ind Engineer Bn and Ind Bridge Coy with Ind Bridge Secs (...)

(b) Characteristics.

H.Qrs Ind Corps Tps Engrs together with the Field Coys and Fd Pk Coy are similar to the Divisional units in both organization and equipment with a few exceptions as follows:

- (i) No Wireless inter-communication facilities are provided so that there is no Wireless link between the C.R.E. and his units, nor are there wireless trucks or signal trained personnel in the Coys.
- (ii) Fd Coy is normally authorised two extra trucks 15-cwt. Compressors and three lorries 3-ton G.S.
- (iii) Fd Pk Coy is authorised an additional Workshop lorry.

37. INDIAN ENGINEER BATTALIONS—(Ind Eng Bns)

(a) Organization.

H.Qrs and four Coys, each with three equal sections.

(b) Normal Roles.

- (i) To assist Divisional and other formation Engineers in the execution of normal Engineer works in the field.
- (ii) To assist in the construction of roads and airfields, for which the size of the Eng Bn is generally advantageous.
- (iii) To execute camp constructional and other semi-technical Engineer work.

(c) Characteristics

Engineer Bns are 100 per cent armed. M.T. is provided for carriage of equipment, but not for personnel, except such as is necessary for inter-communication and recce and control of work. There is an adequate scale of tradesmen's and field works tools plus explosives as well as a scale of pneumatic equipment and water supply equipment.

38. INDIAN BRIDGE COY- and INDIAN BRIDGE SECTIONS—(Ind Br Coy and Ind Br Sec) (...)

(a) Organization.

H.Q. Ind Br Coy and a varying number of Ind Br Secs (...)

The number of Ind Br Secs (...) in one Br Coy depends on the equipment being carried and amount likely to be wanted in the operations for which the Coy is intended.

(b) Role.

(i) The Ind Br Coy is an I.E. Unit which corresponds to the Br Coy R.A.S.C. in the British organization. Both are carrying units and the erection or construction of the bridges they carry will normally be carried out by Field Companies or other Engineer units.

(ii) Unlike the Br Coy R.A.S.C., all the personnel of Ind Br Coys are I.E. and have therefore had basic engineering training.

(c) Characteristics.

(i) H. Qrs Ind Br Coy includes the maintenance element of the unit and carries tradesmen's tools and equipment for this purpose.

(ii) Ind Br Secs (...) normally carry one of the following types of equipment:

Mk. V. Pontoon.

American Pontoon.

Bailey Bridge.

Bailey Pontoon.

The type of equipment carried by each Ind Br Sec (...) is shown in the brackets after the designation of the unit e.g. 889 Ind Br Sec (B.B.) This avoids confusion with Ind. Bridging Sections (see Sec. 33 (c)) which carry light bridging equipment.

The personnel establishment of Ind Br Secs (...) is standard except for slight additions in particular cases. The scale of vehicles varies with the type of equipment being carried.

41. INDIAN ARMY TROOPS ENGINEERS—(Ind Army Tps Engrs)

(a) Organization.

H.Qrs Ind Army Tps Engrs and three Ind Fd Coys are normally allotted to Army Tps Engrs, and in addition there may be an Ind Fd Pk Coy and normally the following:

One Ind Wkshop and Pk Coy per Corps.

Two Ind E. & M Coys per Corps.

Three Ind A. W. Coys per Corps.

In addition, other Engineer units may be allotted as Army Tps. including :

- Ind Army Tps Coys.
- Ind Quarrying Coys.
- Ind Forestry Coys.
- Ind Well Boring Secs.
- Ind B.D. Coys and Secs.
- etc. etc.

(b) Characteristics.

- (i) H.Qrs Ind Army (or L. of C.) Tps Engrs includes a C.R.E., a Major as 2nd. i/c, and an Adj. This H.Qrs includes no Field Engineers nor an Intelligence Officer. It includes proportion of other ranks and essential non-combatants to enable this H.Q. to live independently of Formation H.Qrs if required.
- (ii) Ind. Fd Coys and Fd Pk Coy, if allotted, are normally organized and equipped as for those allotted to an Ind Corps Tps Engrs.

42. INDIAN ARTIZAN WORKS COMPANIES— (Ind AW Coys)

(a) Organization.

Headquarters and four Sections.

(b) Roles.

- (i) Primary role is the planning, organization and execution of large scale construction projects such as buildings or hutted camps of all natures.
- (ii) Construction of bridges, culverts etc. in connection with roads.
- (iii) Normal field engineering tasks such as is covered by the unit's syllabus of training.

(c) Characteristics.

Unit is 100 per cent armed and trained to carry out its own defence against air and ground attack.

Equipment includes sets of tradesmen's tools, a few field works tools and a small amount of explosives, but no water supply equipment.

M.T. is provided for carriage of equipment, and minimum considered necessary for control and supervision of work which the unit may be carrying out. It will normally have to be supplemented.

The unit has a high proportion of technically trained supervisory personnel and can employ and supervise civilian labour.

43. INDIAN ELECTRICAL & MECHANICAL COYS.—(Ind E & M Coy)

(a) **Organization.**

Headquarters and three equal Sections.

(b) **Normal roles are :**

- (i) The operation and maintenance of electrical and mechanical installations, including repair of plant and machinery sabotaged or destroyed by the enemy.
- (ii) Assistance of a skilled nature to other Engineer units.
- (iii) Such Field engineering work as is required for the carrying out of its own work or for its own protection.

(c) **Characteristics.**

E & M Coy has a mobile workshop lorry with each Sec, some fieldworks and miscellaneous tools in addition to tradesmen's tools carried by the unit, a small amount of explosives, but no field water supply equipment.

44. INDIAN WORKSHOP & PARK COYS.—(Ind Wkshop & Pk Coy)

(a) **Organization :**

- (i) Coy H.Q. Two Workshop Secs. Four Advanced Park Secs.
- (ii) Two of the Subalterns in Coy H.Q. are normally placed in supervisory charge each of two Adv Pk Secs.

(b) **Normal roles are :**

- (i) Coy H.Q. and Wkshop Secs.
To manufacture Eng. stores ordered to be produced in the theatre of operations.
To repair Engr plant other than unit Eqpt.
- (ii) Adv Pk Secs.
To hold, distribute and account for Engineer stores and plant in Adv Eng Pks.
- (iii) Like other Engineer units containing skilled tradesmen, this unit must be prepared to repair and operate sabotaged or captured enemy plant, machinery and installations.

(c) **Characteristics.**

Wkshop Secs of Ind Workshop and Park Coys each include a mobile workshop lorry together with a large scale of heavy machine tools. Most of these are designed for electric power drive. Unit also carries some field works and water supply equipment and a small scale of explosives.

45. INDIAN ARMY TROOPS COYS.—(Ind A Tps Coys)

(a) Organization.

Headquarters, E & M Section and four equal Sections.

(b) Role.

- (i) To undertake constructional work on the L of C for which the inclusion of an E & M Section makes it suitable. Such work as permanent bridging which will involve welding and fitting of steel work might properly be given to an Army Tps Coy to undertake, also oil pipeline construction and similar tasks.
- (ii) To carry out E & M work and to operate and maintain E & M plant where the Coy is located.

(c) Characteristics.

Army Tps Coy is fully armed. There is an adequate scale of M.T. for carriage of equipment and such as is essential for recce and control of work being undertaken. The unit also has two Compressor trucks and two mobile workshop lorries. The Army Tps Coy W.E.T. includes a large scale of field works tools, adequate tradesmen's tools, pneumatic equipment, water supply equipment, but NO explosives.

E & M Section can be organized for work as two large sub-Secs., one of which can operate detached if required.

46. INDIAN QUARRYING COYS.—(Ind Quarry Coys).

(a) Organization.

Headquarters and three equal Sections.

(b) Role.

The operation of quarries and crushing machinery for the production of stone suitable for metalling of roads and airfields or for building work.

(c) Characteristics

Quarrying Coys. are fully armed, like other I.E. units. Unit transport includes a small scale of essential M.T., as well as six trailer compressors. Quarry Coys need to be augmented with considerable unskilled labour, and, if this is available, output of a Quarrying Coy may reach one thousand tons of stone per 24 hours in good conditions.

Provision of explosives for blasting has to be made, and crushing machinery capable of producing up to 50 tons crushed stone per hour must be supplied from Engineer resources.

In addition to the large amount of labour wanted for work with each Quarrying Coy., adequate provision of G.P. transport, preferably tipping lorries, must be made in order to cope with the removal of the crushed stone produced. Special arrangements for rapid loading have to be considered when crushing machinery is being established.

47. INDIAN FORESTRY COYS.— (Ind Fsty Coys).

(a) Organization.

Ind Forestry Coys are organised as H. Qrs and three equal Sections.

(b) Roles.

- (i) The extraction from forests of the average type of tree and its conversion to squares, sleepers, planking or scantling, as may be required.
- (ii) Forestry Coys will not normally be required to clear whole areas of trees, but merely to produce timber as quickly as possible at places whence it can be easily transported to where it is required.
- (iii) Preparation of such access road or roads as are necessary to enable M.T. to draw out timber produced by the Forestry Coy. to existing roads.
- (iv) Construction of such field defences as are required for the unit's own protection.
- (v) Forestry Coys will not normally be required to deliver timber from their mills.

(c) Characteristics.

Ind Forestry Coys are equipped with felling axes, cross-cut and mechanical saws for felling of trees, and mechanical saw-benches and hand saws for conversion to squared timber.

For the extraction of timber, the attachment of tractors with crews and maintenance facilities and/or elephants is necessary.

Saw-mills can be established centrally, or with sections, if required.

Strength of the unit is sufficient to operate the plant with which the unit is equipped. Much of the equipment of Forestry Coys. is heavy and in view of the time taken to erect and get working, frequent moves of Forestry Coys will not be normal.

Forestry Coys are fully armed and trained to undertake their own local defence against both air and ground attack.

49. MECHANICAL EXCAVATING ENGINEERS.

(a) Organization

Headquarters Ind M.E Engrs, Ind M.E. Wkshop & Park Coy and a varying number of Headquarters Ind M.E. Coys, and Ind M.E. Sections.

(b) **Characteristics.**

M.T. is provided for carriage of equipment and for recce and supervision. M.E. units are 100 per cent armed.

The establishment of M.E. units includes no Mechanical equipment. Previous recce for estimation of M.E. tasks and of the machinery most suitable has to be made, and provision of machinery arranged for from pools held by Armies or G.H.Q.

(c) **Detail.**

- (i) *H.Qrs Ind M.E. Engrs.*—Role of this H.Qrs. is the technical control of M.E. units under command, and co-ordination and control of all M.E. work in hand or likely to be taken on later. The H.Qrs is responsible for the recce and planning of machinery for projected work, for the preparation of M.E. appreciations, and working details for M.E. units. The H.Qrs is also responsible for the organization and co-ordination of repairs, and the allocation and demanding of M.E. spares.
- (ii) *Ind M.E. Wkshop & Pk Coy.*—H.Qrs, Park Section, Stores Section, Workshop Section. This unit is responsible for the holding and issue of all M.E. Machinery allotted to it, and for the heavy repairs of M.E. plant with units of M.E. Engrs. The unit is also responsible for the provision and issue of spare parts. The M.T. of the unit includes four workshop lorries, and 46 Low loading trailers or transporters for excavating machinery.
- (iii) *H.Qrs Ind M.E. Coy.*—H.Qrs., Workshop and Park Section.
H.Qrs Ind M.E. Coy is responsible for the administration and control of normally up to four Ind M.E. Sections. With its Workshop and Park Section, this H.Qrs undertakes repairs to, and the holding and allocation of, M.E. machinery for the M.E. Sections under its command.
H.Qrs Ind M.E. Coy includes two Workshop lorries and 6 trailers or transporters.
- (iv) *Ind M.E. Section*—M.E. Sec has no fixed establishment of machinery but machines are allotted as required for the particular tasks being undertaken. The establishment of the unit is based on provision of operators to keep 10 prime movers at work continuously throughout 24 hours if practicable. The unit's primary role is to operate Tractor drawn M.E. Machinery, Excavators or similar plant. It can also

operate road rollers, stone-crushers or similar machinery, but such employment reduces its capacity for operating the more specialised plant.

M.E. Sec includes tradesmen and tools to undertake first line repairs to the machinery which it may be operating.

- (v) Excavating Machinery—Brief notes on principal types will be found in Sec. 98 of this pamphlet.

50. HEADQUARTERS INDIAN CRE WORKS— (HQ Ind CRE Wks) and INDIAN WORKS SECTIONS—(Ind Wks Secs)

(a) Organization.

H.Qrs Ind C.R.E. Wks is intended to control Ind Wks Secs whose number will depend on the work in hand.

(b) Role.

The role of these units is the supervision of Military or local civilian labour and transport on works in operational areas.

(c) Details.

- (i) H.Qrs Ind C.R.E. Wks is commanded by a C.R.E. (Lt.-Col.) who has an A.C.R.E., Adj., G.E.(E /M.) and Officer-in-Charge of Stores on his staff. The C.R.E's. H.Q. also includes a small supervisory staff and a proportion of Indian ranks and non-combatants to enable the C.R.E's. H.Q. to exist as a separate unit. Transport is provided to enable officers adequately to get about and supervise work.

All military personnel are armed.

- (ii) Ind Wks Sec is commanded by a G.E. (Major) who has an A.G.E. (Capt.) and two A.G.E's. (Capts. or Lieuts.) to assist. The supervisory staff may be British or Indian and Indian ranks and non-combatants are included in the unit to make it self-contained. Transport is provided to enable Officers and other supervisory staff to get about and control works. All military personnel are armed.

51. INDIAN FORWARD AIRFIELD ENGINEERS— (Ind Fwd Airfld Engrs)

(a) Organization.

H.Qrs Ind Fwd Airfld Engrs, two Ind Fd Coys, one Ind Eng Bn M.E. units will be allotted from M.E. Engrs resources normally on the basis of one Ind M.E. Sec for each Fwd Airfld Engrs.

(b) Characteristics.

Units of Fwd Airfld Engrs receive special training in the rapid construction and re-conditioning of airfields and are intended to operate close up to the leading units of an advance.

(c) Detail.

H.Qrs Ind Fwd Airfld Engrs is on the same W.E. as H.Q. Ind Div Engrs. Fd Coys are similar to Div Fd Coys, but are authorised extra lorries as for Fd Coys in non-Div roles.

G.P. Transport is required for work with Ind Fwd Airfld Engrs. on the basis normally of one G.P. Tpt Coy (tipping lorries) for each Ind Fwd Airfld Engrs.

52. LINES OF COMMUNICATION AIRFIELD ENGINEERS—(L of C Airfld Engrs)

(a) Organization.

H.Qrs L of C Airfld Engrs, three Ind Works Secs, two Ind A.W. Coys, one Ind E/M Coy.

(b) Characteristics.

L. of C. Airfld Engrs is intended to form a self-contained formation capable of constructing airfields up to all weather heavy bomber standard, with all connected works.

(c) Detail.

H.Q. L. of C. Airfld Engrs is on the same establishment as H.Q. Ind C.R.E. Wks. Other Ind Engr units are as shown in the relative sections of this pamphlet both as regards establishment and equipment, but they have special training in their airfield construction role.

The following units of other Arms are normally required with L. of C. Airfld Engrs to enable this organization to function at its maximum output.

Survey Dett.

Labour—up to four Bns.

Transport—two G.P. Tpt Coys (Tipping lorries).

53. GENERAL RESERVE ENGINEERING FORCE—(GREF)

(a) Organization and Role.

G.R.E.F. has a H.Qrs organized on its own W.E. intended to control large resources of engineer units, labour, and transport, allotted for major engineer projects, such as airfields, road construction etc.

(b) Detail,

H.Qrs. G.R.E.F. includes, in addition to Engineer officers, staff officers of other services in order to organize and control the administration, movement, etc. of the engineer resources, labour, and transport allotted to G.R.E.F.

G.R.E.F. will not be called upon to undertake works in advance of forward Divs.

54. HEADQUARTERS INDIAN BOMB DISPOSAL COYS.—(HQ Ind BD Coys) and INDIAN BOMB DISPOSAL SECTIONS—(Ind BD Secs)

(a) Organization.

H.Qrs Ind B.D. Coy may control a varying number of Ind B.D. Secs according to the likelihood of amount of incidents to be dealt with in a particular area.

(b) Role.

- (i) Recce and disposal of unexploded bombs which threaten vital targets.
- (ii) Disposal of other unexploded bombs.
- (iii) Carrying out of normal field engineering tasks when not employed on primary roles.

(c) Characteristics.

H.Q. Ind B.D. Coy is responsible for the administration and co-ordination of the work of Ind B.D. Secs under its command, and for liaison with the Civil A.R.P. Services. B.D. Secs may be distributed on likely static targets such as large towns, or factories, or attached to formations for employment in dealing with unexploded bombs on military targets including airfields.

(d) Details.

H.Q. B.D. Coy includes B.O.R.'s. and V.C.O.'s. for B.D. recce. B.D. equipment is carried by B.D. Secs which are each commanded by a subaltern, who is the only officer in the unit.

Both H.Q. B.D. Coy and B.D. Secs are 100 per cent armed.

55. NOTES ON SPECIALIST UNITS.

Details of the more common types of units only are given in this pamphlet. There are many types of specialist units about whom details are not published, either for security reasons, or because such units are few in number or small in size.

Details are also not given of units designed to operate special plant, descriptions of which would be outside the scope of these notes.

60. War Equipment Tables.

W.E.T's. are designed to contain the minimum of equipment which must on the average be readily available in all units whatever their role or location.

It is not practicable to modify the W.E.T. for one particular role in one particular theatre of operations, since this would upset many other similar units on different roles and in other parts of the world. Special requirements of equipment for particular theatres must normally be obtained as Engineer stores and NOT by trying to get the War Equipment Table altered. Any equipment held by a unit on its W.E.T. which it is not required to carry in particular operations should either be dumped under orders of C.R.E., or other Commander, with an Engineer Stores unit so as to be readily available on demand later, or else returned to Ordnance in accordance with I.A.O. 1535/43.

BRIDGING EQUIPMENT.

61. Classification of Bridges and Vehicles.

- (a) Bridges are classified and marked 5, 9, 12, 18, 24, 30, 40, 50, 60, 70. Classification is made on the assumption that vehicles are never closer than 80 ft. nose to tail.
- (b) Vehicles are classified and marked in multiples of 1 ton.
- (c) The following is a general indication of what vehicles may cross the various classes of bridge.

Class 3 (Rafts) • Jeeps, cars, station wagons, carriers (wheeled), truck 15 cwt. Amphibian Jeep, Dodge $\frac{1}{2}$ ton.

5 - Lorries 30 cwt., Fd. Arty., Armd. Carriers (tracked), Lt. Tk. Mk. VI (3 men). Ford Scout Car.

9 - Lorries 3-ton, Workshop Lorries, Lt. Tk. Mk. VII (Tetrach), Armd. G.P. Vehicles, Amphibian $2\frac{1}{2}$ -ton DUKW, Armoured Personnel Truck,

12 • Lorries 6-ton. Armoured Command Vehicle.

18 • Lorries 10-ton, Med. Arty., Cruiser Tks. Mk. VI (Crusader). Inf. Tks. Mk. III (Valentine).
American Lt. Cruiser Tk. (Gen. Stuart).

24 - Inf. Tks. Mk. II (Matilda), Hy. Arty.

30 - Generals Lee and Grant Tanks. * Federal Transporter with Gen. Stuart tank up.

46 • Churchill Tank, Scammell Transporter (with Gen. Lee or Grant Tank up).

50 - *Federal Transporter with Valentine Tank up.

60 - *Federal Transporter with 20-ton load.

70 - Diamond T. Transporter (with Churchill tank up).

*High classifications are due to heavy rear-axle loading ; strength of decking is limiting factor.

M.E. Machinery. Plant.	Classification.	
	Without attachments.	With attachments.
Portable Compressor -		
2 wheeled.	—	3
4 wheeled.	—	5
Dumper 2 cu. yd.	—	3
Scraper - under 8 cu. yds.	—	9
8 - 13 cu. yds.	—	12
Motor grader.	—	12
Tractor Class D		
D-4	5	9
„ Class C		
D-6 50 - 64 H.P.	9	12
„ Class B		
D-7 65 - 86 H.P.	12	18
„ Class A		
D-8 over 87 H.P.	18	24

NOTES :—

(i) *Trailers.*

If the above machines are mounted on trailers, *add* :—

For trailers to carry up to 12-tons - 4-tons.

„ „ „ over 12-tons - 6-tons.

(ii) *Rollers.*

All rollers have the weight marked by the makers.

(iii) *Tractors.*

The cases quoted above are worst cases. Owing to the distribution of the load, the classification may be reduced over short spans, and each case must be considered on its merits.

(iv) *Classification of Equipment Bridges.*

Class 3 ... Tracked raft, F.B.E.

Class 5 ... Bridge, F.B.E., Mk. II, and Decked Raft
Ferries, F.B.E., Mk. II and Mk. III.

Class 9 ... S.B.G., Mk. II, 2-girder, 48 ft. and 64 ft.,
F.B.E., Mk. III.

Class 12 ... S.B.G., Mk. III, 2-girder, 48 ft. and 64 ft.
Lightened American Ponton Bridge 292'.

Class 18 ... S.B.G., Mk. II, 2 girder, 32 ft.
S.B.G., Mk. II, 4-girder, 64 ft.
Two-pier raft Pontoon Bridge.
L.B.G., Mk. I, 4-girder, 80 ft. span.

Class 22 ... American Ponton Bridge 210'.

Class 24 $\frac{5}{8}$... S.B.G., Mk. II, 4-girder, 48 ft.
S.B.G., Mk. III, 2-girder, 32 ft.
S.B.G., Mk. III, 4-girder, 64 ft.
Three-pier raft pontoon bridge.
L.B.G., Mk. II, 4-girder, 98 $\frac{1}{2}$ ft. or 130 ft.,
depending on type of dogs used.
Hamilton bridge, 140 ft. span.
Stock spans, 26 ft., 32 ft., 37 ft.

Class 30 ... Reinforced American Ponton Bridge - 157'.

Note :—For loads carried by the Bailey Bridge see para 69.

62. Equipment carried by I.E. Units.

(a) *Div. and Non-Div. I.E. Units* carry Bridging Equipment as follows :—

Equipment.	Fd Pk Coy Lt.	Fd Pk Sqn	Bridging Sec	Notes.
Recce. Boats	21	32	32	Also Ind Fd Sqn 4. " " Coy 3 " " Pk Coy 4
Assault Boats	30	64	64	Boat will hold 7 Armed men plus crew of 2.
Outboard Motors	15	30	30	Johnson "Seahorse" 9.8 HP.
Indian Mat Bridge	240 ft.			Including Flying Bridge Tackle.
F.B.E. Mk. III set	—	1	1	Boat will hold 16-20 armed men plus crew of 5.
Bridges 12' No. 3	—	18	—	Will take Class 9 Wheeled or Class 12 tracked loads.
S.B.G. Mk. III set	—	—	2	Will make two 48 ft. or one 64 ft. of Class 24 Bridge.

(b) *Corps Bridge Secs. I.E.* each carry one of the following Bridging Equipments :—

	Equipment "Units."	Notes.
Mk. V Pontoon.	Mk. V Pontoon	16 each 2 pontoons & 1/3 bay superstructure, in 1 pontoon lorry.
	Mk. VII Trestle	2 each 1 trestle & 1 trestle bay, in 1 special & 1/2 G.S. lorry.
	Sliding Bay	2 each 1 sliding & 2 shore bays, in 1 special & 1/2 G.S. lorry.
	Long Landing Bay	2 each 1 long landing bay, in 2 special lorries & 1 G.S. lorry.
	Motor Boat	1 carried on a trailer.
	Accessory	1 G.S. lorry with 2 propulsion units & superstructure one short bay.
American Pontoon.	Ponton (each one trailer)	24 each 1 ponton and 1 floating span.
	Trestle " " "	8 each 1 trestle & 2 trestle spans.
	Motor Boats " " "	2
Bailey Bridge.	Panel (each one lorry)	12 10 panels each.
	Decking " "	8
	Transom " "	4
	Ramps " "	4 each 2 10' ramps.
	Accessory (Bailey) " "	2
Bailey Pontoon.	Bow Pontoon (each one lorry)	16 each 2 end pontoons and 10' deck.
	Centre Pontoon " "	8 each 2 centre pontoons and specials for 1 raft.
	Landing Bay " "	1
	Landing Bay Transom " "	1
	Accessory (B.P.) " "	1 accessories for pontoons.
	Motor Boats (each one trailer)	2

(c) Capabilities of these equipments are given later.

63. Small boats and Outboard Motors.

(a) *Recce boat.*

- (i) A two-man inflatable rubber boat,
- (ii) Wt. 38 lbs. complete with pump, bag, paddles, etc.
- (iii) Likely to be superseded by Ranger Boat No. 3.
Carried by all Fd Units and Bridging Sections.

(b) *Assault Boat Mk. II.*

The standard infantry assault boat, carried by 1 Fd Pk Sqns and Bridging Sections and Fd Pk Coy (Light).

- (i) Collapses flat.
- (ii) Carries 7 armed men plus crew of 2.
- (iii) Weight 162 lbs.
- (iv) Can be driven by 9.8 H.P. outboard motor at 6 m.p.h. (loaded).

(c) *Christie Assault Boat.*

- (i) A folding Masonite boat capable of pack carriage, and intended for use by Light Divisions.
- (ii) Carries 4 - 5 armed men.
- (iii) Weight 80 lbs.
- (iv) Pairs can be linked by transoms and driven by 9.8 H.P. outboard motor at 4 m.p.h. (5 men in each boat) and 4½ m.p.h. (one man in each boat).

(d) *Christie Recce Boat.*

- (i) A 2-man folding Masonite boat for pack transport.
- (ii) Weight 60 lbs.
- (iii) There are no fixed scales at present.

(e) *Outboard Motor Johnson Seahorse 9.8 H.P.*

Used with Assault Boat Mk. II and carried by the same units. A twin-cylinder 2 - stroke engine weighing about 65 lbs.

(f) *Scale, Weights and Sizes.*

		<i>Recce Boats.</i>	<i>Assault Boats Mk. II.</i>	<i>Christie Assault Boats.</i>	<i>Christie Recce Boats.</i>	<i>Outboard Motor</i>
Scales.	Fd Sqn	4				
	Fd Pk Sqn	32	64			30
	Fd Coy	3				
	Fd Pd Coy	4				
	Fd Coy (Lt.)	3				15
	Fd Pk Coy (Lt.)	21	30 or 30			
	Bridging Section	32	64			30
Data.	Weight	38 lbs.	162 lbs.	80 lbs.	60 lbs.	65 lbs.
	Length open	6' 8½"	12' 1½"	10' 0"	7' 6"	
	Width „	2' 8½"	4' 8"	3' 6"	2' 6"	
	Height „	1' 3"	1' 11" (at bow)	1' 4"	1' 1½"	
	Length closed	2' 6"	12' 1½"	5' 4"	4' 0"	
	Width „	1' 3" dia.	4' 8"	3' 6"	2' 6"	
	Height „		4"	1½"	1½"	
	Carrying capacity	2 men	7 armed men and Crew of 2	4-5 men	2 men	

64. Indian Mat Bridge.

(Ref. G.H.Q. letters 57794/III/EIE of 12/10/42, 6/11/42, 14/12/42, 21/12/42, 4/1/43, 13/1/43, 20/3/43 and 24/4/43, giving details, preliminary working instructions, and amendments).

(a) Composition of a Set.

Raft Units - 8, each comprising - complete 30' raft ...	1.
shore landing ...	$\frac{1}{2}$.
anchor buoy and accessories ...	1.

In addition, the 240' set of 8 raft units has :—

Assault boat Mk. II ...	1
Outboard motors ...	2
Cordage for haulage and spare S.W.R. 2" ...	170 fms. }
Traveller block 9" double ...	2 } for improvised flying bridge.

Each raft unit is carried in 1 3-ton G.S. lorry.

(b) For capabilities of one set, see Plate I.

65. Folding Boat Equipment Mk. III.

(Ref. M.E. Vol. III, Pt. II, Pamphlets 2 & 9 Prov. Hand Book for FBE Mk. III 1941).

(a) Composition of a set.

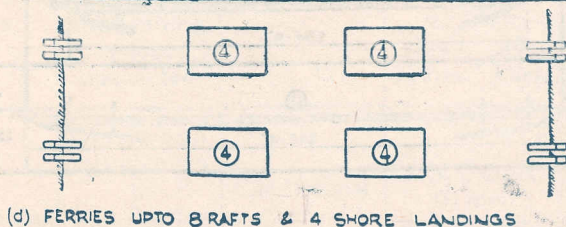
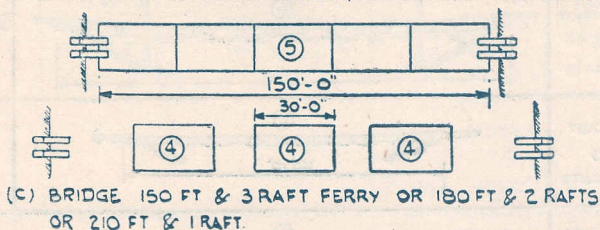
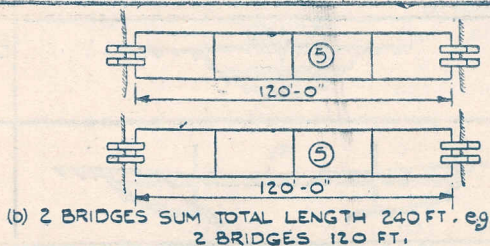
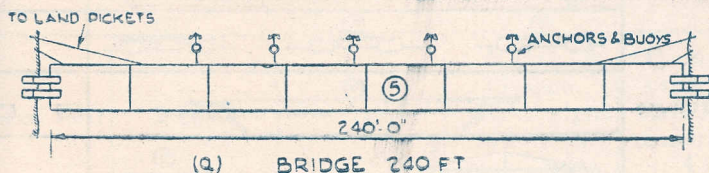
Unit.	No.	Each containing.	Each carried in.	Remarks.
Landing Stage.	4	1 trestle. 1 boat. 2 bays super-structure.	3-ton special lorry	
Raft.	4	3 boats. $1\frac{1}{2}$ bays super-structure.	ditto	2 Raft units will make 3 decked rafts.
Centre Deck Panel.	2	20 deck panels.	15-cwt. truck	} 3-ton G.S. in India.
Auxiliary Rafting.	2	1 propulsion unit. 1 set ferrying gear.	ditto	
Total transport - Lorries FBE 3-ton special ...				8.
Lorries 3-ton G.S. ...				3.

INDIAN MAT BRIDGE

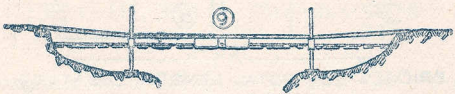
THIS IS A FLOATING BRIDGE AND TAKES CLASS 5 LOADS ON THE BRIDGE OR CLASS 4 LOADS ON RAFTS IF USED FOR FERRYING

THE BRIDGE UNIT CONSISTS OF 8 BASIC RAFT UNITS MAKING 240 FT OF BRIDGE OR 4 RAFTS & 4 SHORE LANDINGS.

THE EQUIPMENT CAN BE USED TO MAKE THE FOLLOWING BRIDGES AND FERRIES.



NOTE - 1 ASSAULT BOAT, 2 OUTBOARD MOTORS & 85 FM SWR FOR FLYING BRIDGES ARE INCLUDED IN EACH 240 FT BRIDGE UNIT

FOLDING BOAT EQUIPMENT EXAMPLES OF USE OF ONE SET		
UNITS USED	RAFTS AND BRIDGES WHICH CAN BE MADE, SHOWING LOAD CLASS.	SPARES
ONE RAFT UNIT		
2 RAFT UNITS		
		
		
		
		
2 RAFT UNITS		
		
		
2 RAFT UNITS		
		
ONE LANDING STAGE UNIT		
2 LANDING STAGE UNITS		
ONE RAFT UNIT 2 LANDING STAGE UNITS		
2 RAFT UNIT 2 LANDING STAGE UNITS		
4 RAFT UNITS 2 LANDING STAGE UNITS		
4 RAFT UNITS 4 LANDING STAGE UNITS		

(b) Details.

	Data.	Class.	Construction*	Remarks.
1	2	3	4	5
Single Boat.	Length 22' Wt. 870 lbs.	Buoyancy 4.2 tons with 6" freeboard.	Carrying and launching 12 - 16 men.	Capacity 20 armed men plus 5 crew.
Tracked Raft	2 boats	3½	1 N.C.O. & 13 men day night 10 30 mins. mins.	Cannot be used with bank height of more than 4 ft.
Decked Raft	Bay of 2 boats	5. but requires landing stages	1 N.C.O. & 10 men day night 5 15 mins. mins.	If two bays are coupled, class 9 can be taken.
Landing Stage	1 trestle 1 boat 2 bays sup- erstructure	9 when coup- led to cl. 9 raft	Near Bank. 1 N.C.O. & 6 men day night 10 40 mins. mins. Far Bank. 2 N.C.O. & 16 men day night 30 60 mins. mins.	Time varies greatly with site.
Bridge	Decked rafts and landing stages connected	9	5 N.C.O. & 42 men day night 1½ hrs. 3 hrs.	Times for 160 bridge.
Shore loading Raft	One decked raft coupled to half-floating bay, with special balancing gear	5 individual e.g., one Lt. tank or 2 M.G. carriers	1 N.C.O. & 10 men day night 30 70 mins. mins.	

* NOTE :—These times must be taken as a guide for average sites and weather conditions ONLY. No time or personnel have been included for unloading and laying out stores. If gas respirators have to be worn, these times would be 30% longer. If suits, anti-gas (without hoods) have to be worn, the times would be 100 per cent longer.

(c) For capabilities of one set, *see* Plate II.

66. Small Box Girder, Mk. II & III.

(Reference M.E. Vol. III, Part II, *Pamphlets 5 and 5a*).

(a) Composition of a set :—

		<i>Transport.</i>		
Hornbeam Sections	8	Carried in 2	3-ton special lorries.	
Box Sections	4	" " 1	" "	" "
Decking	64 ft.	" " 2	3-ton G.S. lorries.	

(b) Details :—

		<i>Mk. II.</i>	<i>Mk. III.</i>
(i)	Weight of Hornbeam Section	1135	1335
	" " Box	1130	1335
(ii)	The girder sections of Mk. III are 3" wider and 1" less deep than those of Mk. II, and cannot be carried in vehicles designed for Mk. II. Vehicles designed for Mk. III will carry Mk. II.		
(iii)	Unloading and Construction. A 2-girder, 64 ft. bridge can be constructed by day in 2 hrs. from time of arrival of lorries at the site, including normal work necessary on bankseats and approaches. The same additions to this time should be made if gas conditions prevail as are shown in the footnote end of para. 65.		

(c) For capabilities of 2 sets, as carried in Indian Bridging Sections, *see* Plate III.

67. Pontoon Mk. V.

(Ref. M.E. Vol. III Pt. II, Pamphlet Nos. 3, 9 & 10).

(a) Composition of a set.

(32-pontoon, as carried by Ind. Br. Sec. (Mk. V Pontoon)).

One Ind. Br. Sec. (Mk. V Pontoon) has :—

16 Pontoon units - each 2 pontoons and 1/3 bay of raft super-structure carried in one pontoon lorry.

2 Trestle units - each 1 trestle and 1 trestle bay of super-structure carried in one trestle and sliding bay lorry and 1/2 - 3-ton G.S. lorry.

SMALL BOX GIRDER BRIDGE MK II & MK III
THE FOLLOWING BRIDGES CAN BE BUILT WITH 2 SETS.

CLASS MK II		CLASS MK III
(9)		 (12)
TWO 64 FT 2 GIRDER BRIDGES		
OR		
(18)		 (24)
ONE 64 FT 4 GIRDER BRIDGE		
AND		
(18)		 (24)
TWO 32 FT 2 GIRDER BRIDGES		
OR		
(24)		 (50)
ONE 32 FT 4 GIRDER BRIDGE		
OR		
(18)		 (24)
FOUR 32 FT 2 GIRDER BRIDGES		
OR		
(24)		 (40)
TWO 48 FT 4 GIRDER BRIDGES		
OR		
(24)		 (50)
TWO 32 FT 4 GIRDER BRIDGES		
OR		
(5)		 ()
ONE 80 FT 2 GIRDER BRIDGE (MK II & MK III)		
AND		
(9)		 (18)
ONE 48 FT 2 GIRDER BRIDGE		
OR		
(24)		 (50)
ONE 32 FT 4 GIRDER BRIDGE		

- 2 Sliding-bay units - each superstructure for 1 sliding bay and 2 shore bays, carried in 1 trestle and sliding bay lorry and 1/2 3-ton G.S. lorry.
- 2 Long-Landing - bay units - each one long-landing bay, carried in 2 long-landing bay lorries and 1 - 3-ton G.S. lorry.
- 1 Motor boat - carried on a trailer drawn by 3-ton G.S. lorry.
- 1 Miscellaneous lorry - with 2 propulsion units and 1 bay of short raft superstructure.

(b) **Details of equipment.**

- (i) **Pontoon Mk. V.**—Overall dimensions - 20' × 6' 9" × 2' 9"
Weight - 1500 lbs. British.
1600 lbs. Indian.

Net buoyance of a pier (2 - pontoons) with 8" free board - 9-tons; will support cl. 24 load when grounded.

(ii) **Trestle Mk. VII.**

Legs 11' 1½" × 7" × 3 ⅜". Weight 230 lbs.
Transom 14' × 13" × 6". " 435 lbs.

- (c) For types of Landing Stages, and limiting dimensions *see* Plate IV.

For types of Rafts, *see* Plate V.

For types of Bridge which can be made with a 32-pontoon set, *see* Plate VI, which also shows an example using 3 such sets (96-pontoons).

68. American Ponton Equipment.

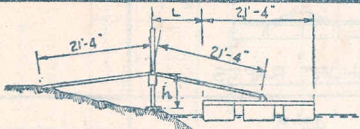
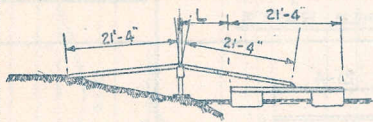
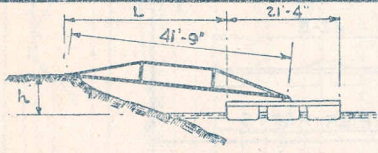
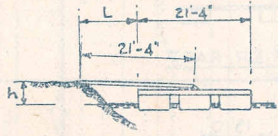
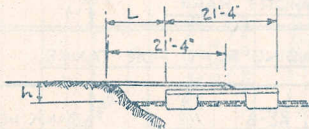
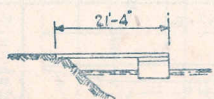
(Ref. E-in-C. (India) Pamphlet No. 6. U.S. Technical Manual 25-ton Ponton Bridge Model 1940, dated July 1st, 1942).

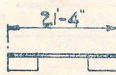
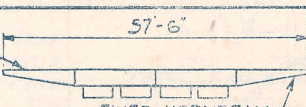
(a) **Composition of a set.**

Units.	No.	Each containing.	Each carried on.	Remarks.
Ponton	12	1 Ponton 1 bay superstructure	Semi-trailer	Towed by 6 × 6 Mack Tractors.
Trestle	4	1 trestle 2 trestle bays super- structure	Semi-trailer	
Power boat	1	1 Utility Power Boat	Trailer	Towed by G.S. Vehicle or tractor.

NOTE :—Ind. Br. Sec. (American Ponton), has 2 such sets, *i.e.*, 24 Ponton units. (*See* para. 62).

PONTOON MK V EQUIPMENT
TYPES OF LANDING STAGES

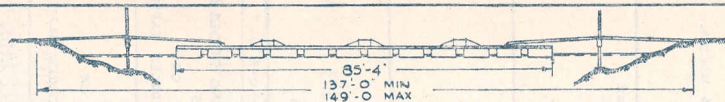
	CLASS		h	L
(1)	(24)	 <u>TRESTLE & NORMAL RAFT</u>	3'-2" TO 5'-0"	4'-6" TO 10'-6"
(2)	(18)	 <u>TRESTLE & TWO PIER RAFT</u>	3'-5" TO 5'-11"	4'-6" TO 10'-6"
(3)	(24)	 <u>LONG LANDING BAY & NORMAL RAFT</u>	3" TO 7'-3"	24'-6" TO 30'-6"
(4)	(24)	 <u>SLIDING BAY & NORMAL RAFT</u>	3'-3" TO 4'-9"	4'-6" TO 10'-6"
(5)	(18)	 <u>SLIDING BAY & TWO PIER RAFT</u>	3'-5" TO 4'-9"	4'-6" TO 10'-6"
(6)	(18)	 <u>HALF FLOATING BAY</u>	RAFT MUST BE WITHIN 4" OF LEVEL WHEN UNLOADED.	

PONTON MK V		TYPES OF RAFTS
CLASS		REMARKS
(24)	 26'-0" 2 SHORT RAFTS	
(24)	 42'-8" 2-3 PIER RAFTS	UNNECESSARILY LONG & DIFFICULT TO PROPEL
(22)	 21'-4" 3 PIER RAFT	
(18)	 42'-8" 2-2 PIER RAFTS	
(16)	 21'-4" 2 PIER RAFT	
	 13'-0" SHORT RAFT	UNSUITABLE FOR ANY SAVE LIGHTEST VEHICLES.
SHORE LOADING RAFT FOR TANKS.		
(26)	 42'-8" 2-2 PIER HALF FLOATING BAY	BANK HEIGHT - 0" - 2'-3" 2'-0" OF WATER NECESSARY UNDER INSHORE PONTON.
(26)	 57'-6" ARTICULATED HORNBEAM. FIXED HORNBEAM SHORE LOADING RAFT	BANK HEIGHT ABOVE WATER 3'-3" MAX. SUPERSTRUCTURE: - 2 GIRDERS PONTON LANDING BAY WITH SPECIAL SPACERS.

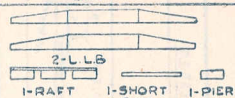
EXAMPLES OF BRIDGES WHICH CAN BE MADE WITH PONTOON MK V

CLASS

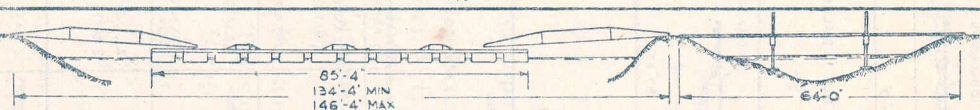
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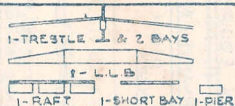
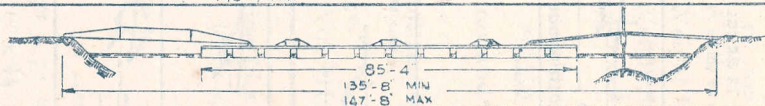
SPARES



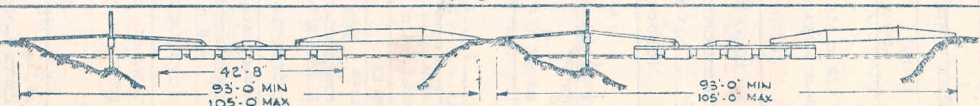
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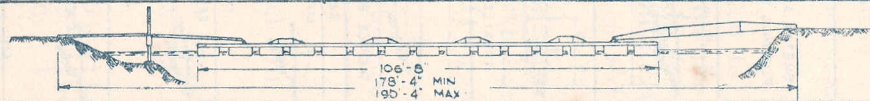
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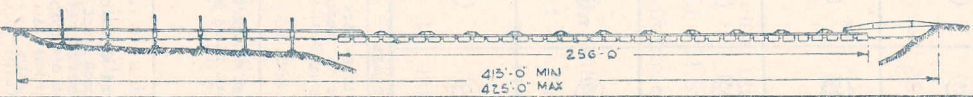


LONGEST BRIDGE

96 PONTOON

1/3 FLOATING SPARES

24

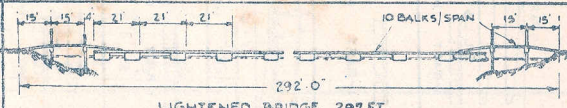
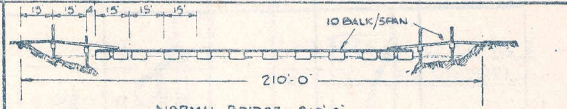
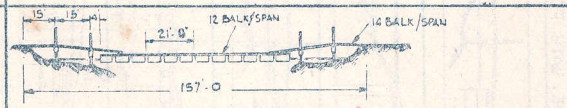
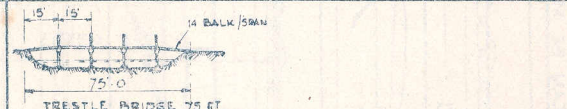
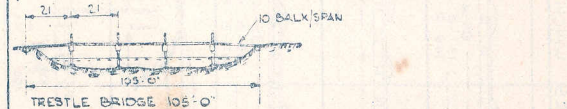


NOTE: { USING ALL RAFTS, (NO FLOATING SPARES) . LENGTH OF FLOATING BRIDGE = 341'-4". TOTAL LENGTH = 498'-4" MIN 510'-4" MAX }

SPARE - 5 L.L.B. 3 SHORT BAYS }

AMERICAN PONTOON EQUIPMENT

ONE UNIT MAKES UP THE FOLLOWING ALTERNATIVE BRIDGES AND FERRIES

CLASS		BRIDGES	
AMERICAN SHORT TONS	BRITISH EQUI- VALENT APPX		
(15)	(12)		
(25)	(22)		
(30)	(26)	SKETCH AS FOR CLASS 22 BRIDGE BUT 12 BALKS USED IN FLOATING SPANS INSTEAD OF 10.	
(35)	(31)		
(35)	(31)		
(10)	(9)		
CLASS		FERRIES	NO. FROM ONE UNIT
LIMITED BY DECK SPACE TO ABOUT CLASS 12.			4 LANDING STAGES & 4 RAFTS OR 2 REINFORCED RAFTS
CAN BE REINFORCED TO TAKE CLASS 31			3 RAFTS OR 1 REINFORCED RAFT.
LIMITED IN CAPACITY BY FLOOR SPACE AND DIFFICULTIES OF ON AND OFF LOADING: A RAMP MUST BE IMPROVISED.			2 LANDING STAGES 2 RAFTS
			2 LANDING STAGES 4 RAFTS.

(b) Details.**(i) Ponton.**

Length	32' 9"	Weight { Aluminium	2600 lbs.
Width	6' 5½"	{ Steel	4000 "
Depth	3' 4"	{ Plywood	2800 "
		Max. Displacement	41400 "

Can carry 100 armed men in addition to boat crew, with outboard motor.

(ii) Trestle.

Weight less chain hoists - 1415 lbs.

(iii) Semi-Trailer.

Length of Trailer alone = 35'

Length (including overhang of ponton) ... = 41' 4"

Width ... = 8'

Weight Empty - 7200 lbs.

Weight loaded - with ponton unit (aluminium)
16,300 lbs.
with trestle unit - 21,550 lbs.

Weight of dolly to convert to full-trailer - 2 tons approx.

(iv) Time and Labour for construction.—(See E.-in-C.

(I) Pamphlet No. 6, Sec. 49).

(c) For capabilities of one set (12 ponton), see Plate VII.**69. Bailey Bridge.**

(Ref. M.E. Vol III, Part II, Pamphlet No. 12, modified for India).

(a) Composition of a set.

Panel lorry units - 12 each with 10 panels.

Decking " " - 8 " " 20' deck less transoms.

Transom " " - 4 " " 12 transoms.

Ramp " " - 4 " " 2, 10' ramps.

(b) Details.

Panel 10' 0" × 5' 1" × 7"	Weight 570 lbs	} Length of a Bay = 10', hence length of bridge is always multiple of 10'.
Transom 18' 0" × 10" × 4½"	" 445 "	
Chess 11' 11" × 8¾" × 2"	" 50 "	

Two transoms per Bay up to Class 40.

All components are carried in standard 3-ton G.S. lorries except transoms; these may also be carried in G.S. lorries if special wooden trestles are fitted. Otherwise long body ("flat") lorries are required.

(c) **Maximum Spans for Load Classes Shown.**

	9	12	18	24	30	40
S.S.	90	80	60	60	50	30
D.S.	150	140	110	110	100	80
T.S.	170	160	140	140	120	110
D.D.	180	180	160	150	140	130
T.D.	200	190	180	170	160	150

Bridges below the thick line require extra equipment.

(d) For capabilities of the set, see Plate VIII.

70. Bailey Pontoon Bridge.

(Ref. M.E. Vol. III, Part II, Pamphlet No. 12, modified for India).

Bailey Pontoon Bridge is formed by the combination of Bailey Bridge with Bailey Pontoon Equipment.

(a) Composition of a set.

Bow Pontoon Lorry Units - 16, each with 2 end pontoons and 10' of deck.

Centre „ „ „ - 8, each with 2 centre pontoons and specials for one raft.

Landing Bay Lorry Unit - 1, with specials for 2 Landing bay piers, less transoms, landing bay.

Landing bay transom Lorry Unit - 1, with transoms, landing bay for two landing bay piers.

Pontoon Accessories Lorry Unit - 1, with pontoon accessories.

(N.B.—Not the same as Bailey Bridge accessories unit).

N.B.—Of the 16 tripartite piers, 4 are normally treated as spare and 12 are used in bridge.

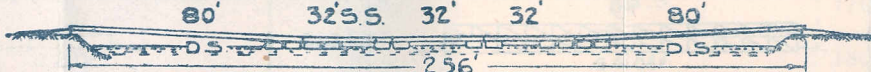
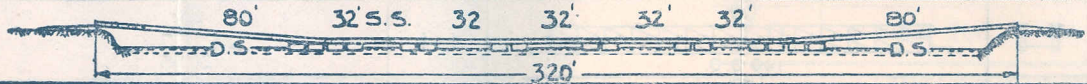
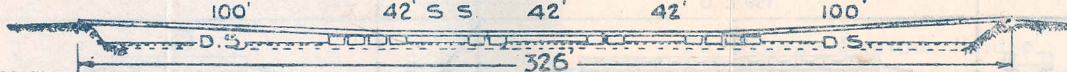
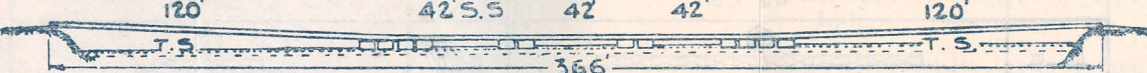
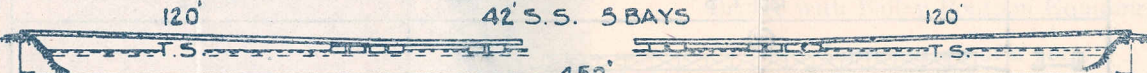
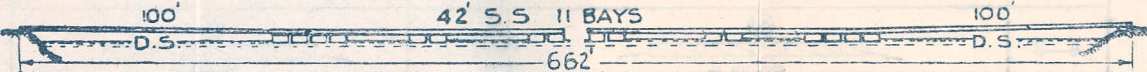
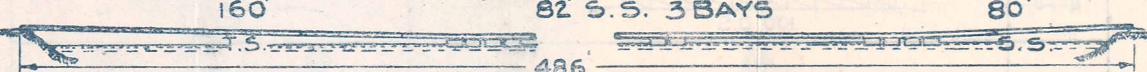
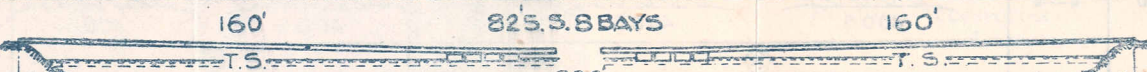
(b) For capabilities of sets, see Plate IX.

EXAMPLE OF THE USE OF ONE 130'-0" D.D. BAILEY BRIDGE SET.

NOTE: (a) WHERE MORE THAN TWO BRIDGES ARE USED, 10' RAMPS MUST BE USED IN SOME CASES. b, 10' RAMPS ARE PROVIDED, ALLOWING 20' RAMPS FOR 2 BRIDGES.

(b) HIGHEST LOAD CLASSES UP TO CLASS 40 ARE SHOWN FOR EACH COMBINATION

BAILEY PONTON BRIDGE CAPABILITIES OF SETS COMBINED (A SELECTION ONLY)

CLASS	BAILEY SEC.	B. P. SECS.	LONGEST SINGLE BRIDGE	SPARE PIERS	SPARE DECK	SPARE PANELS
40	1	1		4	70' 0"	38
					10' 0"	26
	2	1	NO INCREASE - 2ND SET BAILEY CANNOT BE USED			
30	1	1		4		16
	2	1		4	120' 0"	72
					40' 0"	56
	2	2		4		72
12	1	1	326'-0" (SAME AS CLASS 30, BECAUSE NO MORE DECKING)			
	2	1		4		80
				6		16
	4	2		10		152

74. TRADESMEN'S TOOLS.

The common tradesmen's tools are provided in standard sets. The number of sets provided is based on the number of tradesmen in the unit, but is not intended to allow all tradesmen in the unit to be provided with tools at the same time. Hence most of the sets are held in Coy. H.Q. for issue to Sections as required, rather than in sections themselves. Sections of Fd. units, in addition to H.Q. are provided with "Handyman" sets, which include the more common tools of general application, with which every Sapper should be familiar.

For scales of Tradesmen's Tools held by units, see Table B.

For composition of sets, see Sec. 101 et seq.

75. FIELDWORKS TOOLS.

(a) Sets of fieldworks tools are issued on a sub-section basis in Fd Coys, and mule bags are provided for ease of transport on pack. Other units have sets of fieldworks tools and entrenching tools at various scales, but do not have containers suitable for pack loading.

(b) For scales of fieldworks equipment, see Table C. For scales of Blocks, Cordage and S.W.R., see Table D.

76. WIRING STORES, ANTI-TANK & ANTI-PERSONNEL MINES, & MINE DETECTORS

Scales held in both 1st and 2nd line are shown in Table E.

(a) Wiring Stores.

- (i) *A. & M.T. Div. and M.T. Div. 2nd line.* 9 tons are allowed for wiring stores. This is equivalent to 1200yds of triple Dannert concertina fence, but double apron fence, or low wire fence may be provided instead. (Note that 9 tons of Dannert wire can NOT be carried in 3 3-ton lorries owing to its bulk, unless the roof frames are removed. The load is then high and must be secured). A 3-ton 4 by 4 lorry can take 260yds. of triple Dannert concertina fence without special arrangements.

Transport for this lift is provided as required from G.P. Tpt Coys.

- (ii) 2nd line scales for Lt Divs and Armd Divs are not fixed.
- (iii) Table showing numbers and weights of stores required for per mile of wire obstacle of different types are given in E.-in-C. (India) Pamphlet No. 2 Sec. 11. Details of wire obstacles are given in War Office M.T.P's. 21, 21a, 21b and 30 Part III.

(b) A tk and A per Mines.

- (i) The present policy is to hold No. 75 (Hawkins) Grenades only in 1st line. Mines A tk will continue to be provided in 2nd line in addition to the Hawkins.
- (ii) A per Mines are not carried as equipment except by the Parachute Sqn, which has Mine A per No. 3 Mk. I. This is a small jumper, actuated by either pressure or trip wire.
- (iii) Particulars of the various mines are given in M.T.P. 40 (1943)-Indian reprint.

(c) Mine Detectors.

- (i) Basic unit scales are low, but a pool of 30 is carried by the Division, and by Fwd Airfd Engrs.
- (ii) Note that mine detectors are also authorised for arms other than Engineers.
- (iii) Experience warrants the assumption that 25 per cent will be out of action at any one time.
- (iv) *Polish Mine Detectors.*

Total weight—30lbs.

Length of arm (short arm) 3ft. 0in.

Length of arm (long arm) 6ft. 0in.

The battery used is Dry Battery H.T., 60 volt, No. 1.

78. DEMOLITION EQUIPMENT & EXPLOSIVES.

For scales in 1st and 2nd line, see Tables "F" and "G." Certain rear units are provided with a small outfit of exploders etc. and a small quantity of explosives for odd jobs, destruction of duds, U.X.Bs., and so on..

79. EXPLOSIVES & ACCESSORIES.**(a) Explosives.**

- (i) Explosive 808 is allowed as an alternative to Gun-cotton.
- (ii) Gelignite is no longer allowed as an alternative to Ammonal owing to its rapid deterioration in hot climates. It will, however, be available as a bulk explosive when required in situations where the turn-over is rapid, e.g. road construction.
- (iii) 1000 lbs. of 808 are now authorised in Fd Pk Coys as an immediate Divisional reserve. 808 is suitable for both cutting and borehole charges.
- (iv) The Fd Pk Sqn has no Fd Tp corresponding to the Fd Sec in Fd Pk Coy and no explosives.

(b) Made-up Charges.

- (i) The only specialised charge issued as equipment is the 6 lb. Beehive. Other types such as the Gen. Wade, limpets, clams etc. will be issued from stock as required for particular operations.
- (ii) The existence of this Charge Demolition I.C. Engine Mk. I, intended for issue to all B vehicles of the field army, should be remembered. It contains one slab of G.C., and a friction igniter, with a delay of one minute.

(c) Accessories.

- (i) Rubberised fabric, sheaths rubber, lassolastic, tape adhesive, and an additional amount of tape insulating are authorised, for holding together and water proofing made-up charges and igniter assemblies.

(d) Bangalore Torpedo.

- (i) This is not unit equipment, but will be provided as an Ordnance Store ready filled.
- (ii) The type made in India consists of 5ft. lengths of 2in. pipe, filled with ammonal, with easy-thread screw connections.
- (iii) One nose cap and one igniter set are provided with every three lengths, and are packed in a box 4.05in by 4.25in. by 13.05in.
- (iv) Safety fuze and detonator are NOT included in the igniter sets. These are to be inserted in the field to give whatever delay is required.
- (v) Weight of one 5ft. filled Section—25 lbs.
Weight of ammonal filling per section—7 lbs. 12 oz.
- (vi) Four sections without nose cap and igniter, are carried in a clamp with a handle, weighing about 120 lbs. in all. Stowage dimensions are 67.5ins. by 7ins. by 7ins.

(e) Exploder Mk. VII*

This will fire a circuit including 40 No. 33 Detonators and 400 yds. of double standard cable EI Mk. II.

80. 2nd LINE SCALES OF EXPLOSIVES.

- (a) These consist of three elements:—

A—complete replacement for Div. 1st line.

B reserve of booby trap stores.

C—bulk explosives.

(b) Weights of these elements in tons are:—

	A	B	C	TOTAL
Armd Div ...	3.8	0.98	1.01	5.79
A and MT Div ...	6	1.46	1.54	9
Lt Div ...	4.9	0.98	1.01	6.89
Corps Tps ...	12	1.46	1.54	15

(c) No specific transport is allotted for the 2nd line lift. It will normally be on the ground at the Div Amn Pt and will be moved as and when required by G P Tp Coys.

82. WATER SUPPLY EQUIPMENT.

For scales, see Table "H."

(a) The basic pumping set is the No. 4. Ind Fd Coys and Ind Fd Pk Coys each have two of these sets. I E units in Armd formations have an increased scale.

(b) The subsidiary set is the No. 5. This is intended:

(i) for detachments.

(ii) for issuing to vehicles from storage tanks at large water pts.

It will not go on pack.

(c) For units expected to go on pack, the Jaeger Bantam 1½ H.P. pump is provided in lieu of the No. 5 set.

(d) Pneumatic ("Sump") Pumps are provided in field units to be run from the compressor truck. The sump pump apart from its use as such, may be used for water supply in an emergency if the normal eqpt. breaks down.

Its use as a water supply pump is, of course, very uneconomical in power, and should NOT be normal.

83. PARTICULARS OF PUMPS.

(a) *Pumping set No. 4.* (Ref. Handbook of Pumping Set No. 4, 1939, Engine Petrol 8 B.H.P., 1939, Drives Flexible, 1939.)

(i) Performance is shown in Plate X.

(ii) The 8 B.H.P. Petter engine is identical with that used with the Propulsion unit, and with the Lighting set 4 K.W., but with a different mounting. It is a twin-cylinder, aircooled horizontally opposed, 4-stroke engine with pressure lubrication. Weight 310 lbs.

(iii) Overall dimensions:—

	Length	Breadth	Height
Crate with 2 Centrifugal Pumps	31"	15"	15"
Engine Petrol 8 B.H.P. ...	34½"	30½"	36"
Wellhead Gear ...	79½"	18½"	16½"

- (iv) The engine can be used to drive up to 4 pumps either in series or in parallel, through flex drives of 22mm. or 17.5 mm., according to the arrangement. This allows great flexibility in method of use to meet varying conditions.

(b) *Pumping Set No. 5.* (Ref. Provisional Working Instructions, Pumping Set No. 5, 1941).

- (i) A single cylinder inverted, aircooled 2-stroke engine, coupled direct to a centrifugal pump. Petroil lubrication.

(ii) Performance is shown in Plate X.

(iii) Dimensions: Length 2ft. 0in., breadth 1ft. 11in. height 2ft. 4½ins.

(c) **Jaeger Bantam 1½ H.P.**

- (i) A single-cylinder aircooled 2-stroke coupled direct to a centrifugal pump. Splash lubrication.

(ii) Performance (approx.) at 2,300 r.p.m.

Delivery Head ft.

G.P.H.

5

2000

25

1250

50

340

These figures are sometimes improved upon, and vary considerably with individual pumps. Performance is very sensitive to adjustment of the needle valve controlling the mixture, and of the governor.

- (iii) The set is somewhat fragile, and should be kept in a stout box.
- (iv) Dimensions—Length 21ins., breadth 11ins., height 19ins.

(d) **Pumps L. & F.**

- (i) Mk. V weighs 74 lbs.

Mk. VI (Indian) weighs 176 lbs.

Mk. V Pumps are reserved for units expected to go on pack.

(ii) Performance—500 g.p.h. at max. 60ft. head.

(e) **Pump pneumatic.**

("Sump Pump") (Ref. Handbook of Compressor Truck, 1940).

- (i) Should NOT be allowed to run for long periods without attention. First-class maintenance by a good artificer, who should be in sole charge, is essential.
- (ii) The shaft is easily knocked out of a alignment, causing seizing-up. The pump should therefore NOT be kept in the compressor truck, but packed carefully elsewhere.
- (iii) With a 100 c.ft. compressor, approximate performance is 4000 g.p.h. at 40ft. head with 2in. delivery hose. Max. head about 70ft.
- (iv) Length overall 28ins. Diameter—allow 12ins., on account of projections.
- (v) See also E.-in-C. (India) Pamphlet No. 2, para 25 (g).

(f) **Table of Particulars of Pumps.**

	Wt. of Set. lbs.	Max. head ft.	Max. delivery g.p.h. (d)	Capacity of full tank pints.	Consump- tion on load pints.	Endu- rance one filling hrs. mins.	Capacity of crank case pints.	Working speed. r p.m
Pumping Set No. 4	(a)	220 (c)	14,600	16	See note (e)	See note (e)	4.5	1800
Pumping Set No. 5	110 (b)	50	3,500	8 (Petrol)	2.2 per hr	2 30	—	2500
Pump Jaeger 1½ H.P.	89	50	2,000	2	0.144	1 44	1	2300
Pump L. & F.	Mk. V 74 Mk. VI 176	60	500	—	—	—	—	—
Pump pneumatic	44	70	4,000	—	50 c.ft. free air per min.	—	—	3000

NOTES :—

(a) Includes - Centrifugal pumps	- 2 -	60 lbs. (110 lbs. in
Engine Petrol 8 BHP	- 1 -	310 lbs. crate).
Flexdrives, set	- 1 -	216 lbs.
Wellhead gear, set	- 1 -	288 lbs.
Box Maintenance	- 1 -	48 lbs.

Total 1322 lbs.

Pipe specials, hose and strainers, are NOT included.

(b) Weight with tools complete in crate—176 lbs.

(c) This is total delivery head, including pipe friction loss
Max. static head is unlikely to exceed 200ft.

(d) For method of forecasting deliveries at various static heads through various sizes and lengths of pipe, see Information Series 262, published by E.in-C. (India).

(e) Driving :—	Consumption pints per hour.	Endurance hrs. mins.
1 Pump ...	4	4 —
2 Pumps ...	4.7	3 20
3 Pumps ...	5.2	3 —
4 Pumps ...	5.5	2 50

86. WORKSHOP LORRIES.

The workshop lorries of Fd. Pk. Coys., A. Tps. Coys., and mobile E. & M. Coys. are 3-ton 4-wheeled or 6-wheeled vehicles with flat floor standard workshop bodies. Power is supplied from the vehicle. Certain of the tools can be operated in the vehicle, the remainder must be set up and operated close by, using power supplied from the lorry. (110 V. D.C.)

(b) The equipment includes :

Benches.

Lathes screw-cutting (6½ins. or 7ins.)

Screw-cutting tools.

Grinding machine.

Portable drill.

Radial drill.

Emery wheel dressers.

Portable Forge.

(c) Fd. Pk. Coys. are also authorised a circular saw bench to be driven electrically from the workshop lorry.

(Note: E. & M. lorries are no longer provided in India.)

87. EQUIPMENT OF WORKSHOP AND PARK COY.

(a) In addition to the equipment shown in Tables 'I' and 'J', this unit has the following special workshops equipment:—

*Generating set, 3 phase 400/230 volts A.C.	22 K.W.	... 1
" " " " " "	40-50 K.W.	... 1

Machine Shop.

*Lathes 8" centre S.S. & S.C.		
42" between centres	... 1	with electric motor 400/440 A.C.
*Lathes 6" centre S.S. & S.C. 36" between centres	... 1	" "
Machine drilling electric portable 5/8"	... 2	" 230/250 A.C.
Machine drilling radial 24" capacity 7/8"	... 1	" 400/440
Machine Grinding double wet and dry	... 1	" "
Machine screwing pipe 6"	... 2	" "

Wood working Shops.

Lathes wood turning 6" centre 39" B.C.	... 1	" "
Machine bandsaw brazing	... 1	" 230/250
Machine bandsaw for wood 30"	... 1	" "
*Machine sawing circular 36"	... 4	" 400/440
Machine sharpening bandsaw	... 1	" "
*Machine Sharpening & gulletting circular saw. 4' max dia	... 2	" "
*Machine woodworking universal	1	" "

Smiths Shop.

Hearths Smiths single 36" x 36"	... 4	" 230/250
Machine drilling pillar 2"	... 1	" 400/440
*Machine punching & shearing 1/2" plate	... 1	" "
Machine saw hack 6" x 6"	... 2	" "
Plant welding and cutting H.P. Oxy/Acet. Heavyweight	... 1	— —
Plant welding electric double operator	... 1	" "

(b) The 22 K.W. generator can be used for running a 96 point lighting set, or alternatively in parallel with the 40-50 K.W. set for working power tools.

(c) Machines marked * require special transport.

88. ELECTRIC LIGHTING SETS.

(a)	4 K.W. Portable	Set is 110 volt D.C. and comprises :-	
		Engine Petrol 8 B.H.P.	... 1
		Generator 4 K.W. 110 volts D.C.	... 1
		Switchboard	... 1
		Boards, distributing	... 1
		Leads main, 180' run	... 2
		„ branches, 30' run	... 4
		„ 90' run	... 7
		„ tail	... 60
		Lamp holders, prick-through	... 72
		Lamps 25 watt	... 40
		40 „	... 40
		60 „	... 10

(b) 22 K.W. A.C. Generator

See para 87 (b).

89. WIRELESS SETS.

(a) Sets issued.

No. 22 sets are authorised, but No. 11 sets may be issued in lieu until No. 22 sets are available in quantity.

Particulars are :

SET	WGT.	DIMENSIONS			BATTERY
		L	B	H	
No. 11 Set alone	72 lbs				
Complete outfit	200 lbs.	Set alone 27"	12½"	13"	6 V. 8 Amp/hr.
No. 22 Set alone	34 lbs.				12 V.22
Complete outfit	400 lbs.	Set alone 17"	8"	17½"	12 V.75

(b) Performances.

Range in Miles.

Set	Moving Vehicles		Static Vehicles		Ground Stations	
	R/T	W/T	R/T	W/T	R/T	W/T
No. 11	7	15	10	20	15	35
No. 22	15	25	20	35	20	35

(c) **Charging sets.**

Charging will eventually be carried out by 'N' Sections of Div. Signals. Until these sections are provided, each I.E. unit with Wireless sets will be issued with one 550 watt charging set. Any of the following may be provided:—

	WGT.	DIMENSIONS		
		Length	Breadth	Height
Charging Set 550 Watts				
No. 1	206 lbs.	2' 4"	1' 4"	1' 9"
" " " No. 2	284 lbs.	2' 6½"	1' 4½"	1' 8½"
" " " American	158 lbs.	2' 0"	8½"	2' 0"

COMPRESSORS, PNEUMATIC EQUIPMENT & WARSOP ROCK DRILL.

91. COMPRESSOR TRUCK. (Ref. Handbook of Air Compressor, (truck type) 1940).

(a) The standard set of equipment as provided in the U.K. has been adopted in India. This consists of:—

Breakers concrete 1 with 2 picks steel

Drills hammer 2 with 8 stems and 150 bits detachable

Picks light 2 with 4 spades, 2 steels chisel pointed
and 2 steels pick pointed

Machines wood boring 1 with 24 augurs

Saws pneumatic 1 (or Petrol driven 'Danarm' saw in lieu).

Hose pneumatic ¾in.—50ft. lengths—6 each with 2 unions

Hose pneumatic ¾in.—10ft. lengths—2, each with 2 unions

Connectors hose pneumatic—6

Box maintenance —1

(b) Any two of the above tools can be driven simultaneously.

(c) Bits should be turned over with the Fd. Pk. Coy. for grinding.

(d) A pneumatic sump pump is provided for certain units, but does not form part of the compressor truck set. See para 82 (d).

(e) For particulars of compressor and tools, see Handbook 1940, App. 1.

For scales of pneumatic equipment authorised for I.E. units, see Table K.

92. WARSOP ROCK DRILL.

(a) A self-contained power rock drill with its own petrol driven engine. It is intended for use in places inaccessible to compressor trucks, and can be carried on pack if necessary.

(b) The Homelite portable compressor will be supplied for use in cleaning holes being drilled with the Warsop. It is a self-contained unit.

(c) A conversion set is supplied to adapt the Warsop drill for use as a concrete-breaker.

(d) Details:—

Engine is a single-cylinder aircooled 2 stroke with petrol/oil lubrication.

Weight complete 96 lbs. approx.

Weight of conversion outfit ...lbs.

Weight of Homelite compressor 145 lbs. approx.

Fuel consumption of Warsop Petrol 3 pints per
oil $\frac{1}{2}$ pt. to gall. hour.

93. MECHANICAL SAWS & SAW BENCHES.

UNIT			Machine Sawing Circular	Saw Pneumatic or Danarm Saw	Machine Sawing Circular 36"	Machine Bandsaw for Wood 30"	Sawmill 56"	Saw Bench 48"	Saw Bench 30"-36"	Saw Bench 24"
			(a)	(b)	(c)	(c)	(e)	(e)	(e)	(e)
Indian Fd Sq	...	...		3						
" Fd Pk Sqn	...			2						
" Fd Coy	...	...		1						
" Fd Pk Coy	...	...	1	4						
" Lt Fd Coy	...			1						
" Lt Fd Pk Coy	...	...	1	2						
" Eng Bn	...	...		4						
" Indpt Fd Sec	...			1						
" Workshop & Pk Coy					4	1				
" A Tps Coy	...	...		2						
" Forestry Coy	...			5(d)			1	1	4	3

- (a) 110 V D.C., driven by power from Workshop lorry.
- (b) Saw pneumatic—driven from compressor truck.
Danarm saw—self contained petrol driven.
- (c) 400/440 V A.C. driven by power from 22 K.W. or 40-50 K.W. generator.
- (d) Danarm.
- (e) Each mill or bench is driven by a petrol or oil engine power unit.

95 SUMMARY OF DIVISIONAL 2nd LINE LIFTS IN TONS.

		Armd. Div.	A & M.T. Div.	Lt. Div.
Explosives	...	5.79	9	6.89
Mines			30	
Wire		*	9	*
R.E. Stores	...	*	30	*

* Not fixed.

Transport is provided as required from G.P. Tpt. Coys.

98. Excavating Machines used by M.E. Coy. I.E.

Machine	Description.	Task
Angledozer.	Tracked tractor carrying pusher blade in front set at an angle to the direction of travel.	1. Clearing 2. Cut and fill. 3. Hillside-cutting
Bulldozer.	Similar to angledozer, with blade permanently set at right angles to direction of travel.	1. Clearing. 2. Cut and fill.
Scraper.	Tractor drawn steel "box" on pneumatic tyres with cutting edge on bottom plate.	Cut and fill
Rooter.	Two wheeled heavy steel frame carrying powerful teeth. Tractor drawn.	1. Scarifying 2. Boulder & root clearing.
Blade grader.	Four wheeled frame carrying an earthcutting blade. Tractor drawn.	1. Road formation 2. Ditching 3. Surface dressing 4. Mix-in-place
Motor grader.	Self-propelled machine similar to blade grader on large pneumatic tyres.	1. Road formation and maintenance. 2. Surfacedressing. 3. Mix-in-place.
Elevating grader.	Tractor drawn machine incorporating a disc plow which discharges on to a conveyor belt.	1. Embankments. 2. Canals. 3. Loading.
Ditcher.	Small type single-furrow agricultural type plough. Tractor drawn.	Ditches.
Tamping roller.	A roller with "sheepsfoot" projections on the drum.	Earth consolidation.
Excavator (shovel)	Self powered machine generally similar to a jib-crane, mounted on a base which can revolve on a turntable fitted to tracked undercarriage. The jib carries an arm fitted with a bucket for excavating against an earth 'face.'	1. High cutting. 2. Loading.
Dragline.	Similar to shovel excavator with long single jib, carrying a bucket which is dragged over the ground, scraper fashion towards the machine.	1. Excavation in water. 2. Deep cutting. 3. Loading.

Fieldworks Set.

Item.	No. per set	Remarks.
<i>Section F.</i>		
Crowbars 4' 1"	2	
Hammers, carpenters claw 1 lb. 8 oz. ...	1	
Rules, boxwood 4 fold ...	1	
Saws		
Hand 26 in. ...	1	
Ripping ...	1	
<i>Section J (i).</i>		
Axes		
Felling ...	1	
Handles ...	1	Spare.
Hand ...	1	
Helves ...	1	Spare.
Pick, heads, 6½ lbs. ...	6	
Helves, pick axe ...	9	3 Spare.
Hooks bill ...	1	
Protector's hook bill ...	1	
Shovels Mk. I ...	6	
Helves ...	2	Spare.
<i>Section W-1.</i>		
Cutters wire folding ...	prs 3	
Knives Gabion ...	1	
Tapes tracing ...	2	

Handyman Set.

<i>Section F.</i>		
Adzes, Indian 4½ lbs.		
Handles ...	1	
Heads ...	1	
	1	
Augers		
½ inch. ...	1	
¾ " ...	1	
1 " ...	1	
1½ " ...	1	

Handyman Set.—(Contd.)

Item.	No. per set	Remarks.
Section F.—(Contd.)		
Augers		
Handles		
Large	2	
Small	2	
Brushes		
Sash Tool		
No. 2	1	
No. 8	1	
Chisel		
Cold		
$\frac{3}{4}$ inch.	1	
$\frac{7}{8}$ "	1	
Firmer		
$\frac{3}{4}$ inch.	1	
1 "	1	
$1\frac{1}{4}$ "	1	
Files		
Bastard		
Half round 12 inch.	...	1
H.S.E. 12 "	...	1
Round 10 "	...	1
Square 8 "	...	1
Second Cut		
Flat 8 inch.	...	1
Half round 10 "	...	1
Three square 6 "	...	1
Handles		
Large	...	2
Medium	...	2
Hammers		
Brick I.P.	...	2
Carpenters, claw 1 lb. 8 oz.	...	1
Engineers, ballpane 2 lbs.	...	1
Sledge straightpane 10 lbs.	...	2

Handyman Set.—(Contd.)

Item.	No. per set	Remarks.
<i>Section F.—(Contd.)</i>		
Irons, soldering, straight 2½ lbs.	...	1
Lamps brazing 2 pints	...	1
Lines bricklayers or carpenters	...	2
Oilstones medium	...	1
Pencils, carpenters doz.	...	0-3
Planes		
Jack	...	1
Smoothing 2½ inch.	...	1
Pliers, side cutting 7 "	...	2
Punches, centre 5 "	...	1
Rules boxwood 4 fold	...	1
Rules brass	...	1
Saws		
Cross cut 4 ft.	...	1
Cases	...	1
Hack hand 12 in.	...	1
Blades		
Coarse	...	6
Medium	...	6
Hand 26 inch.	...	1
Tenon 14 "	...	1
Screwdrivers		
Cabinet, 6 inch.	...	1
London, 12 "	...	1
Shears, tinmans, snip straight prs.	...	1
Spanners, adjustable		
6 inch.	...	1
11 "	...	1
15 "	...	1
Squares, carpenters 9 in.	...	1
" smiths	...	1

Handyman Set.—(Contd.)

Item.	No. per set	Remarks.
Tongs, flat, small, close mouth	prs. 1	
Trowels, 10 in.	... 2	
Wrenches, footprint 12 in.	... 2	
Set Cold with eye	... 1	
<i>Section G-1.</i>		
Nails wire		
1½ in. lbs.	... 2	
2 " "	... 2	
3 " "	... 4	
4 " "	... 4	
6 " "	... 8	
Screws wood M.S. c/k. head		
¾ in. × No. 6 gross	... 1	
1 " × " 8 "	... 1	
1½ " × " 10 "	... 1	
2 " × " 10 "	... 1	
3 " × " 12 "	... 1	
<i>Section G-2.</i>		
Solder tinmans soft lbs.	... 1	
Wire, Galvanized, steel soft		
No. 16 S.W.G. lbs.	... 7	
<i>Section W-1.</i>		
Bars, tamping wood	... 1	
Cases, level F.S., & measuring rod	... 2	
Levels F.S. Mk. IV.	... 2	
Tapes tracing	... 4	
<i>Section W-2.</i>		
Bulbs 2.5 Volt "O"	... 1	Spare.
Batteries Dry Lamp Electric	... 3	Includes spare.
Lamp Electric No. 2	... 2	

Handyman Set.—(Contd.)

Item.			No. per set	Remarks.
<i>Section H-1.</i>				
Flux, soldering Paste	lbs.	...	0-6	
Paint P.F.U.				
Black G.S.	pts.	...	1 $\frac{1}{4}$	
Khaki G.S.	"	...	$\frac{3}{4}$	
Red oxide G.S.	"	...	1	
White lead G.S.	"	...	$\frac{3}{4}$	
Yellow G.S.	"	...	$\frac{3}{4}$	
Royal Blue	"	...	$\frac{3}{4}$	
<i>Section M-3.</i>				
Cans oil lubricating 1 pint		...	1	
<i>Section V-2.</i>				
Rods measuring common		...	2	
Tapes measuring metallic woven 100 ft.		...	1	

Set of Blacksmiths Tools.

<i>Section F.</i>				
Braces smiths		...	1	
Bits				
Rimer				
Half round		...	1	
Square		...	1	
Counter sunk rose		...	1	
Chisels, cold				
$\frac{1}{2}$ inch.		...	2	
$\frac{3}{4}$ "		...	2	
Compasses, wing 12 in.		...	1	
Cutters, anvil flat, large shank		...	1	
Files, Bastard				
H S.E. 14 in.		...	1	
Half round 12 "		...	1	

Set of Blacksmiths tools.—(Contd.)

Item.	No. per set	Remarks.
<i>Section F.—(Contd.)</i>		
Files		
Second cut		
H.S.E. 14 in.	...	1
Half round 12 "	...	1
Handles large	...	2
Flatters head	...	1
Fullers		
Bottom large shank $\frac{3}{4}$ in.	...	1
Top $\frac{3}{4}$ in.	...	1
Hammers		
Engineers, ballpane 2 lbs.	...	1
Set with eye	...	1
Sledge straight pane 10 lbs.	...	1
Pokers forge portable	...	1
Punches		
Centre 5 in.	...	1
Smiths		
$\frac{1}{2}$ in.	...	1
$\frac{5}{8}$ "	...	1
Rules brass	...	1
Saws		
Hack hand 12 in.	...	1
Blades		
Course	...	6
Medium	...	6
Sets		
Cold with eye	...	1
Hot	...	1
Slices	...	1
Spanners adjustable 15 in.	...	1
Squares, smiths 2 ft. - 6 in.	...	1

Set of Blacksmiths Tools.—(Contd.)

Item.	No. per set	Remarks.	
Section F.—(Contd.)			
Swages			
Bottom large shank			
$\frac{3}{8}$ in. and $\frac{1}{2}$ in.	...	1	
$\frac{5}{8}$ in. and $\frac{3}{4}$ in.	...	1	
$\frac{7}{8}$ in.	...	1	
1 in.	...	1	
Top with eye			
$\frac{3}{8}$ in.	...	1	
$\frac{1}{2}$ in.	...	1	
$\frac{5}{8}$ in.	...	1	
$\frac{3}{4}$ in.	...	1	
$\frac{7}{8}$ in.	...	1	
1 in.	...	1	
Snaps			
$\frac{3}{8}$ in.	...	1	
$\frac{1}{2}$ in.	...	1	
$\frac{5}{8}$ in.	...	1	
$\frac{3}{4}$ in.	...	1	
Tongs smiths			
Flat			
Small close mouth	...	1	
Medium close mouth	...	1	
Hollow bit	...	1	
Vices, bench, parallel cast $4\frac{1}{4}$ in	...	1	
Section H-1.			
Borax, refined	lbs.	...	1
Section M-3.			
Cans, oil lubricating 1 pint	...	1	

Set of Bricklayers and Masons Tools.

Item.	No. per set	Remarks.
<i>Section F.</i>		
Chisels		
Brick 18 in. $\times$ 1 $\frac{1}{4}$ in.	2	
Cold $\frac{3}{4}$ in.	1	
Hammers		
Brick I.P.	2	
Masons, Scapling 2 $\frac{3}{4}$ lbs.	2	
Levels, spirit rule, 12 in.	1	
Lines, bricklayer or carpenter	1	
Pins, line prs	1	
Rules, boxwood, 4 fold	1	
Rules, Masons Plumb, 2 ft. 6 in.	1	
Squares, smiths	1	
Towels		
Cross joint	1	
10 in.	2	
<i>Section V-2.</i>		
Tapes, measuring, metallic woven, 50 ft.	1	

Set of Carpenters Tools.

<i>Section F.</i>		
Adzes, Indian 4 $\frac{1}{2}$ lbs.		
Handles	1	
Heads	1	
Awls		
Blades Brad		
Large	1	
Small	1	
Handles, small	2	
Bevels wood, 10 $\frac{1}{2}$ in.	1	
Braces carpenters	1	

Set of Carpenters Tools.—(Contd.)

Item.	No. per set	Remarks.
<i>Section F.—(Contd.)</i>		
Bits		
Auger		
$\frac{1}{4}$ in. ...	1	
$\frac{1}{2}$ in. ...	1	
$\frac{3}{4}$ in. ...	1	
1 in. ...	1	
Countersink rose ...	1	
Gouge		
$\frac{1}{8}$ in. ...	1	
$\frac{1}{16}$ in. ...	1	
$\frac{1}{4}$ in. ...	1	
Screwdrivers $\frac{3}{8}$ in. ...	1	
Chisels		
Firmer		
$\frac{1}{4}$ in. ...	1	
$\frac{1}{2}$ in. ...	1	
$\frac{3}{4}$ in. ...	1	
1 in. ...	1	
Mortice		
$\frac{1}{2}$ in. ...	1	
$\frac{5}{8}$ in. ...	1	
Compasses, wing 12 in. ...	1	
Files, saw taper, 2nd cut single 6 in. ...	1	
Gauges, carpenters		
Marking ...	1	
Mortice ...	1	
Hammers, carpenters claw 1 lb. 8 oz. ...	1	
Holdalls, Bits, carpenters, large ...	1	
Levels, spirits block, 9 in. ...	1	
Lines, bricklayers or carpenters ...	1	
Mallets, carpenters ...	1	
Oilstones, mediums ...	1	
Pencils, carpenters doz. ...	0-3	
Pincers, carpenters prs. ...	1	

Set of Carpenters Tools.—(Contd.)

Item.	No. per set	Remarks.
<i>Section F.—(Contd.)</i>		
Planes		
Jack	...	1
Plough	...	1
Smoothing, 2 $\frac{1}{8}$ in.	...	1
Pots, glue, cast iron, 1 pint	...	1
Rasps, carpenters, 12 in.	...	1
Rules, boxwood, 4 fold.	...	1
Saws		
Compass	...	1
Hand 26 in.	...	1
Tenon 9 in.	...	1
Screwdrivers		
Cabinet 6 in.	...	1
London 12 in.	...	1
Sets, saw, hand	...	1
Spokeshaves 3 in.	...	1
Squares, carpenters, 9 in.	...	1
Vices, wood workers	...	1
<i>Section G-1.</i>		
Nails wire		
1 $\frac{1}{2}$ in. lbs.	...	2
2 in. "	...	2
3 in. "	...	4
4 in. "	...	4
6 in. "	...	8
Screws, wood, M/s C/k head		
$\frac{3}{4}$ in. No. 6 gross	...	1
1 in. No. 8 "	...	1
1 $\frac{1}{2}$ in. No. 10 "	...	1
2 in. No. 10 "	...	1
3 in. No. 12 "	...	1
<i>Section H-1.</i>		
Glue lbs.	...	2
<i>Section M-3.</i>		
Cans oil, lubricating, 1 pint	...	1

Set of Electricians Tools.

Item.	No. per set	Remarks.
Section F.		
Chisels		
Cold $\frac{1}{2}$ in.	...	1
Firmer $\frac{1}{2}$ in.	...	1
Files,		
Second cut		
Half round 10 in.	...	1
H.S.E. 10 in.	...	1
Round 8 in.	...	1
Warding, cut on both sides, 4 in.	...	1
Handles, medium	...	2
Hammers, engineers, ballpane 8 oz.	...	1
Irons soldering		
Hatchet $\frac{1}{4}$ lb.	...	1
Straight $\frac{1}{2}$ lb.	...	1
Lamps, brazing, 2 pint	...	1
Pliers		
Insulated 8 in.	prs. ...	1
Round nose 6 in.	" ...	1
Rules, boxwood, 4 fold	...	1
Screwdrivers		
Cabinet 6 in.	...	1
Electricians 3 in.	...	1
Spanners, adjustable, 3 in	...	1
Tweezers, large	...	1
Vices, hand, 4 in.	...	1
Wrenches, pipe, 7 in.	...	1
Section G-2.		
Solder, tinmans soft	lbs. ...	1
Section H-1.		
Cloth emery No. 00	qrs. ...	$\frac{1}{2}$
Flux, soldering, Paste	lbs. ...	0-6
Section W-2.		
Tape		
Insulating $\frac{1}{2}$ in	lbs. ...	0-4
Rubber pure	" ...	0-4
Gloves, rubber	prs. ...	1
Section T.S.P. (M.T.)		
Spanners, Terrys, set	...	1

Set of Fitters Tools.

Item.	No. per set	Remarks.
<i>Section F.</i>		
Braces		
Ratchet 10 in.	... 1	
Posts 16 in.	... 1	
Callipers, firm joint		
4" Inside	prs. ... 1	
4" Outside	" ... 1	
Chisels, cold		
$\frac{1}{2}$ in.	... 1	
$\frac{3}{4}$ in.	... 1	
Compasses wing, 7 in.	prs. ... 1	
Drills		
Stock		
Breast	... 1	
Hand	... 1	
Twist No. 2, Square taper shank		
$\frac{1}{4}$ in.	... 1	
$\frac{5}{16}$ "	... 1	
$\frac{3}{8}$ "	... 1	
$\frac{7}{16}$ "	... 1	
$\frac{1}{2}$ "	... 1	
$\frac{9}{16}$ "	... 1	
$\frac{5}{8}$ "	... 1	
$\frac{11}{16}$ "	... 1	
$\frac{3}{4}$ "	... 1	
$\frac{13}{16}$ "	... 1	
$\frac{7}{8}$ "	... 1	
Twist, parallel shank, H.S.S.		
$\frac{1}{16}$ in.	... 1	
$\frac{1}{8}$ "	... 1	
$\frac{3}{16}$ "	... 1	
$\frac{7}{32}$ "	... 1	
$\frac{1}{4}$ "	... 1	
$\frac{9}{32}$ "	... 1	
$\frac{5}{16}$ "	... 1	
$\frac{11}{32}$ "	... 1	
$\frac{3}{8}$ "	... 1	

Set of Fitters Tools.—(Contd.)

Item.	No. per set	Remarks.
<i>Section F.—(Contd.)</i>		
Files		
Bastard		
Half round 14 in.	...	1
H.S.E. 14 in.	...	1
Round 12 in.	...	1
Square 8 in.	...	1
Second cut, Half round		
8 in.	...	1
14 in.	...	1
H.S.E.		
10 in.	...	1
14 in.	...	1
Round 10 in.	...	1
Warding cut on both sides, 4 in	...	2
Smooth, H.S.E.		
8 in.	...	1
12 in.	...	1
Handles		
Large	...	2
Medium	...	2
Gauges, feeler	...	1
Hammers, Engineer ball pane		
8 oz.	...	1
2 lbs.	...	1
Pliers, side cutting, 7 in.	prs. ...	1
Punches		
Centre 5 in.	...	1
Round $\frac{1}{8}$ in.	...	1
Rules, steel 1 ft.	...	1
Saws hack hand 12 in.	...	1
Blades		
Coarse	...	6
Medium	...	6
Screwdrivers, cabinet, 6 in.	...	1

Set of Fitters Tools.—(Conld.)

Item.	No. per set	Remarks.
<i>Section F.—(Conld.)</i>		
Spanners adjustable		
6 in.	...	1
11 in.	...	1
Spanners Box Tubular	...	
$\frac{1}{2}$ in. & $\frac{9}{16}$ in.	...	1
$\frac{5}{8}$ in. & $\frac{11}{16}$ in.	...	1
$\frac{3}{4}$ in. & $\frac{13}{16}$ in.	...	1
Spanners Double ended		
$\frac{3}{16}$ in. & $\frac{1}{4}$ in.	...	1
$\frac{5}{16}$ in. & $\frac{7}{16}$ in.	...	1
$\frac{3}{8}$ in. & $\frac{1}{2}$ in.	...	1
$\frac{7}{8}$ in. & $\frac{3}{4}$ in.	...	1
$\frac{7}{8}$ in. & 1 in.	...	1
Square fitters 8 in.	...	1
Vices		
Bench parallel cast $4\frac{1}{4}$ in.	...	1
Hand 4 in.	...	1
<i>Section H-1.</i>		
Cloth emery No. 1	qrs. ...	1
<i>Section M-3.</i>		
Cans, oil, lubricating 1 pint	...	1
<i>Section T.S.P. (M.T.)</i>		
Spanners box tubular		
$\frac{1}{4}$ in. & $\frac{5}{16}$ in.	...	1
$\frac{3}{8}$ in. & $\frac{7}{16}$ in.	...	1
$\frac{7}{8}$ in. & 1 in.	...	1
Set of Painters Tools.		
<i>Section F.</i>		
Brushes,		
Sash tool		
No. 4	...	2
No. 8	...	2
Stencil I.P.	...	2
Writing goose large	...	2
Diamonds, glaziers	...	1
Pencils, carpenters	doz. ...	0-3
Hammers, carpenters, Warrington		
pattern 1 lb.	...	1
Rules, boxwood, 4 fold	...	1
Stencils, interlocking brass		
$1\frac{1}{2}$ in.	set. ...	1
1 in.	" ...	1

Set of Painters tools.—(Contd.)

Item.			No. per set	Remarks.
<i>Section H-1.</i>				
Oil, linseed, boiled	gall.	...	1	
Paint P.F.U.				
Black G.S.	pts.	...	1 $\frac{1}{4}$	
Khaki	"	...	$\frac{3}{4}$	
Red-Oxide	"	---	1	
White lead	"	...	$\frac{3}{4}$	
Yellow	"	...	$\frac{3}{4}$	
Royal Blue	"	...	$\frac{3}{4}$	
Cloth, Glass				
No. 00	qrs.	...	$\frac{1}{2}$	
No. 2	"	...	$\frac{1}{2}$	
Turpentine	galls.	---	1	
Whiting	lbs.	...	1	

Set of Saddlers and Textile Refitters Tools.

<i>Section D-1.</i>				
Leather				
Buffalo, curried, backs, heavy lbs.			5	
Cow, curried sides		"	5	
<i>Section F.</i>				
Holdalls, Saddlers, canvas, filled ..			1	See I.A.F.F. 980-301
Leads, punching, saddlers, 4 lbs. ...			1	
Punches, leather oval				
No. 20	...		1	
No. 26	...		1	
No. 28	...		1	
<i>Section G-1.</i>				
Tacks, steel cut, $\frac{3}{4}$ in.	lbs.	...	$\frac{1}{2}$	
<i>Section H-1.</i>				
Beeswax	lbs.	...	$\frac{1}{2}$	
Wax saddlers & shoemakers "		..	1	
<i>Section H-2.</i>				
Canvas, flax, grade A, 36 in.	yds.		10	
Thread, flax, undyed	lbs.	...	$\frac{1}{2}$	
Twine Europe				
No. 1	lbs.	...	1	
No. 2	"	...	1	
No. 3	"	...	1	

Set of Sawyers Tools.

Item.	No. per set	Remarks.
<i>Section F.</i>		
Files		
Second cut		
3 square	...	1
6 in.	...	1
8 in.	...	1
Handles, small	...	1
Lines, bricklayers or carpenters	...	1
Rules, boxwood 4 fold	...	1
Saws		
Frame Indian 4 ft. (a)	...	2
Pit (a)		
Blades 4 ft.	...	2
Boxes	...	2
Handles	...	4
Tillers	...	2
Sets, saws, pit	...	1
<i>Section J (i).</i>		
Wedges, sawyers, 8 in.	...	4

(a) Any one of these two types of saw is authorised, not both.

Set of Draughtsman and Surveyors Tools.

<i>Section V-2.</i>		
Boards, drawing imperial	...	1
Cases, map cylindrical	...	2
Chains, measuring, 100 ft. with 10 arrows	...	1
Clinos pendant	...	1
Compasses		
Magnetic, plane table	...	1
Proportional 6 in.	...	1
Covers, canvas, plane table	...	1
Curves, drawing, architects	set ...	1
Instruments drawing G.S.	„ ...	1
Levels pocket Mk. IV	...	1
Levels 9.5 I.P.	...	1
Protractors, semi circular, celluloid	...	1
8 in.	...	1
Rules, sight, 18 in.	...	1

Set of Draughtsman and Surveyors Tools.—(Contd.)

Item.	No. per set	Remarks.
<i>Section V-2.—(Contd.).</i>		
Scales		
Builders set ...	1	
Math		
No. 1 " ...	1	
No. 5 " ...	1	
Set square Common		
6 in.		
45 degrees ...	1	
60 degrees ...	1	
10 in.		
45 degrees ...	1	
60 degrees ...	1	
Tables, plane, portable ...	1	
Tapes measuring		
Metallic woven 100 ft. ...	1	
Steel 100 ft. ...	1	
T-square 36 in. Mahogany ...	1	
Tripod, plane table, portable ...	2	
Watches G.S. ...	1	
<i>Stationery Department Supplies.</i>		
Cloth tracing, 36 in wide (24 yds. on a roll) rolls ...	1	
Erasers, ink and pencil doz. ...	1	
Ink, drawing, waterproof		
Black bottles ...	3	
Red " ...	1	
Green " ...	1	
Yellow " ...	1	
Knives, desk office ...	1	
Paper		
Blotting, white demy, 40 lbs. quires	1	

Set of Draughtsman and Surveyors Tools.—(Contd.)

Item.	No. per set	Remarks.
<i>Stationery Department Supplies.—(Contd.)</i>		
Drawing, mounted section		
$\frac{1}{16}$ in. Dvn. 30 in. $\times$ 22 in. quires ...	2	
$\frac{1}{16}$ in. Dvn. 30 in $\times$ 22 in. „ ...	2	
Imperial 72 lbs 30 in $\times$ 22in „ ...	1	
Writing		
Azure laid foolscap „ ...	2	
Cream laid foolscap „ ...	2	
Pencils, Drawing		
BB doz. ...	0-6	
B „ ...	0-6	
HB „ ...	2-0	
HHH „ ...	0-6	
HHHHH „ ...	0-6	
Coloured		
Red „ ...	1-0	
Blue „ ...	1-0	
Green „ ...	0-6	
Yellow „ ...	0-6	
Brown „ ...	0-6	
Penholders accomodation ...	2	
Pens		
Crow quill with holders cards ...	2	
Steel nibs		
Gillotts medium box ...	1	
Hink and Wells „ ...	1	
Pins drawing $\frac{3}{4}$ in. doz. ...	4	

Set of Tinsmiths Tools.

Section F.

Bellows, brazier, small	...	1
Chisel, cold $\frac{3}{4}$ in.	...	1
Compasses, wing, 12 in. prs.	...	1

Set of Tinsmiths tools.—(Contd.)

Item.		No. per set	Remarks.
<i>Section F.—(Contd.)</i>			
Files,			
Second cut			
Half round 8 in.	...	1	
H.S.E. 10 in.	...	1	
Round 10 in.	...	1	
Handles, medium	...	1	
Hammers, Tinmans			
Block or hollowing 3 lbs. 8 oz.	...	1	
Creasing $\frac{3}{4}$ lbs.	...	1	
Panning	...	1	
Horses, tinmans $6\frac{3}{4}$ lbs.	...	1	
Irons soldering			
Hatchet 1 lb.	...	1	
Straight $2\frac{1}{2}$ lbs.	...	1	
Ladles 6 in.	...	1	
Lamps Brazing 2 pints	...	1	
Mallets, tinmans	...	1	
Pliers			
Roundnose 6 in.	prs. ...	1	
Sidecutting 7 in.	" ...	1	
Punches			
Centre 5 in.	...	1	
Indian	set ...	1	
Rivetting	...	1	
Rules, brass	...	1	
Screwdrivers, cabinet 6 in.	...	1	
Sets, rivetting, tinmans	set ...	1	
Shears, tinmans, snip straight	prs. ...	1	
Squares, smiths	...	1	
<i>Section G-2.</i>			
Solder, tinmans, soft	lbs. ...	4	
Wire, galvanized, steel, soft			
No. 16 S.W.G.	lbs. ...	10	
<i>Section H-1.</i>			
Borax refined	lbs. ...	1	
Flux soldering, Paste	" ...	0-6	
Rosin	" ...	0-8	
Salamoniac lump	" ...	0-8	
<i>P. & S. Group.</i>			
Brass Scrap	lbs. ...	0-8	
<i>R.I.A.S.C. Supplies Group fuel.</i>			
Charcoal common	lbs. ...	20	

Troop Leaders Reconnaissance Set

Item.	No. per set	Remarks.
<i>Section V-2.</i>		
Instruments drawing, Field set	1	
Protractors, semi circular, celluloid 8 in. special	1	
Cases Map G.S.	1	
<i>Stationery Department Supplies.</i>		
Paper, Drawing Mounted section		
$\frac{1}{12}$ Dvn. 30 in. $\times$ 22 in. Sheets	2	
$\frac{1}{10}$ Dvn. 30 in. $\times$ 22 in. Sheets	2	
Imperial 72 lbs. 30 in. $\times$ 22 in. Sheets	2	
Pencils		
Drawing H.B.	2	
Coloured		
Red	1	
Blue	1	
Green	1	
Yellow	1	
Brown	1	
Grease		
Red	1	
Blue	1	
Green	1	
Yellow	1	
Brown	1	
<i>Set of Welders Tools.</i>		
<i>Section F.</i>		
Chisels, cold		
$\frac{3}{4}$ in.	1	
$\frac{1}{2}$ in.	1	
Compasses, wing, 12 in.	1	

Set of Welders tools.—(Contd.)

Item.	No. per set	Remarks.
Section F.—(Contd.)		
Files,		
Bastard		
Flat 12 in.	2	
Round 10 in.	2	
Square 10 in.	2	
Handles, large	2	
Hammers, engineers ball pane 2 lbs.	1	
Plant, welding and cutting oxy.		See IAFF. 980-301
acetylene set	1	
Punches, centre, 5 in.	1	
Rules, brass	1	
Squares		
Fitters 8 in.	1	
Smiths	1	
Tongs smiths flat		
Medium close mouth	1	
Vices hand 4 in.	1	
Section G-2.		
Welding Rods		
C.C.M.S		
$\frac{1}{16}$ in.	3	
$\frac{1}{8}$ in.	7	
$\frac{1}{4}$ in.	3	
Sif bronze		
$\frac{1}{16}$ in.	1	
$\frac{1}{8}$ in.	3	
$\frac{1}{4}$ in.	4	
Ferro Sillicon		
$\frac{1}{8}$ in.	2	
$\frac{3}{16}$ in.	2	
Section H-1.		
Borax	2	
Cylinders		
Dissolved accetylene gas		
100/120 c. ft. capacity	1	
Oxygen gas 150 c. ft. capacity	2	
Flux welding		
Sif bronze	2	
Cast iron	2	

GALLONS PER HOUR

14000

12000

10000

8000

6000

4000

2000

-10

0

10

30

50

70

90

110

130

150

170

190

210

FEET HEAD

CHARACTERISTICS OF PUMPING SETS

3 PUMPS PARALLEL

4 PUMPS PARALLEL

2 PUMPS PARALLEL

1 PUMP

1 PUMP

2 PUMPS SERIES

2 PUMPS SERIES

3 PUMPS SERIES

4 PUMPS SERIES

FULL LINES — CHARACTERISTICS OF PUMP SET NO. 4
DOTTED LINES — " " NO. 5
⊗ — INDICATES ENGINE OVERLOADED

⊗

TABLE "A"

Summary of War Establishments (Incorporating probable amendments to 1 Nov 43)

UNIT.	PERSONNEL						TRANSPORT											WEAPONS						REMARKS
	BO	BOR	VCO	Hav	R & F	Foll	M/Cycle	Jeep	Car SW	Truck 15 cwt GS	Truck Compressor	Lorry Water 220 Gallon	Lorry 3 ton winch	Lorry 3 ton GS	Misc	Pistols	Rifles	CM Sten	CMT	LMG	A/Tk R			
HQ Ind Armd Div Engrs	4			3	8	Pool																(a) May be replaced by MES Civilians.		
Ind Fd Sqn (Two)	6	3	5	14	221	6	5								15 (b)	20	221		10	10	10	(b) 3 Scout Cars, 6 arm'd Trucks, 6 Carriers wheeled		
Ind Fd Pk Sqn (One)	5	4	5	13	167	5	7								19 (c)	13	112	71		9	9	(c) 2 Scout Cars, 1 Workshop, 8 FBE 4 Transporters		
Total Ind Armd Div Engrs	21	10	15	44	617	17	17								49	52	553	73	20	29	29	2 Amph., 2 3-ton Long Body		
HQ Ind Div Engrs	5			6	17	2	3	2								8	9	11		1	1			
Ind Fd Coy (Three)	5	2	5	12	234	8	7	4								20	232		8	8	4			
Ind Fd Pk Coy (One)	4	3	3	12	181	8	5								4 (d)	9	143	53		4	4	(d) 1 Workshop, 3 low load 10-ton.		
Ind Bridging Sec (One)	1		1	5	75	3	1	1 (e)							16 (f)	3	78		2	2	2	(e) Amph.		
Total Ind Div Engrs	25	9	19	59	975	37	30	7							20	80	926	64	26	31	19	(f) 6 S.B.G., 8 F.B.E. 2 Amph. 2 1/2-ton.		
HQ Ind Lt Div Engrs	4			2	5	Pool																		
Ind Lt Fd Coy (Two)	6	2	5	13	227	6	7	6								21	222		12	8	4			
Ind Lt Fd Pk Coy (One)	4	3	3	12	188	6	6	1							27 (g)	11	132	69		6	3	(g) 1 Workshop, 26 Tr. 15-cwt. Mat. Br.		
Total Ind Lt Div Engrs	20	7	13	40	647	18	20	13							27	53	574	69	24	22	11			
HQ Fwd Airfield Engrs	5			6	17	2	3	2								8	9	11		1	1			
Ind Fd Coy (Two)	5	2	5	12	234	8	7	4								20	232		8	8	4			
Ind Eng Bn (One)	10		20	48	872	36	7		1	10	4	2		19		18	855	80		13	13			
Total Fwd Airfield Engrs (basic element)	25	4	30	77	1357	57	29	10	1	60	10	4	2	27		66	1328	91	16	30	22			
Ind Indpt Fd Sec	1		1	2	61	1	1	1		3						3	60		2	2	1			
Ind Parachute Sqn	10		5	13	134	5	3		1	1				8		107	21	34		1				
Indpt Fd Stores Sec		1		2	16												17		2	1	1			
HQ Ind Corps Tps Engrs	5		1	4	17	3	3		1	2				1		5	17	5						
Ind Eng Bn	10		20	48	872	36	7		1	10	4	2		19		18	855	80		13	13			
HQ Ind Br Coy	3	2	2	9	73	6	3	1	2	3			1	5	6 (h)	7	47	36		1		(h) 2 Breakdown, 2 Derrick, 2 Amph. 2 1/2-ton.		
„ „ Sec (Mk V Pontoon)	1	1	1	3	90	2	3			1			1	7	27 (i)	4	16	76		1		(i) 17 Pontoon, 10 Superstructure,		
„ „ „ (American Ponton)	1	1	1	3	96	2	3			1			1	3	32 (j)	4	17	81		1		(j) Ponton Tractors and Trailers.		
„ „ „ (Bailey Bridge)	1	1	1	3	90	2	3			1			1	28	6 (k)	4	16	76		1		(k) 6 Long Body.		
„ „ „ (Bailey Pontoon)	1	1	1	3	90	2	3			1			1	5	28 (l)	4	16	76		1		(l) 26 Pontoon, 2 Long Body.		
HQ Ind Army or L of C Tps Engrs	3			3	7	2			1	1						3	5	5						
Ind Workshop & Park Coy	7	8 (a)	5	15	215	26	2		1	5				12	2 (m)	10	203	39		7		(m) Workshop.		
Ind E & M Coy	5	4 (a)	4	15	200	8	5		1	4			2	2	3 (m)	11	193	26		5				
Ind A W Coy	4	2 (a)	5	15	225	7	4			1				7		7	264	13		5				
Ind Army Troops Coy	7	4	6	15	277	8	3			12	2	1		9	2 (m)	10	260	41		6	4			
Ind C E/D C E Works	8	17 (a)			15	14	1		5							15	25							
HQ Ind CRE Works	5	6 (a)		2	13	5	3	2	1	2						8	6	12						
Ind Wks Sections	4	20 (a)		2	13	5	2	4	1	7						6		33						
HQ Ind BD Coy	3	2	3	6	18	3	1		1	3						9	23							
Ind BD Sces	1		1	2	29	2	1			2			1	2		3	30							

TABLE "A" (Contd.)

SPECIALIST UNITS.	Personnel.						Transport.									Weapons.						Remarks.
	B.O.	B.O.R.	V.C.O.	Hav.	R. & F.	Foll.	Motor Cycles	Jeep.	Car S.W.	Truck 15 cwt. G.S.	Truck 15 cwt. Compressor.	Lorry Water 220 Gall.	Lorry 3-ton winch.	Lorry 3-ton G.S.	Misc.	Pistols,	Rifles.	C.M. Sten.	C.M.T.	L.M.G.	A/Tk. R.	
HQ 1nd ME Engrs	6	2 (a)	1	10	27	3	2		1	4				1		8	22	16		1		(a) May be replaced by M.E S. Civilians.
HQ Ind ME Coy	3	2	3	10	99	3	2	2		8				5	11(n)	5	79	35		1		(n) 6 Lorries 7-10 ton, 2 Wkshop, 1 Lorry 6×4 Stores, 2 Transporters.
Ind ME Sec	2		1	5	77	2	2			2				5		4	72	9		1		
Ind ME Wkshop & Pk Coy	5	3	5	27	278	5	2			3				10	50(o)	7	229	83		1		(o) 4 Wkshop, 2 Lorries 6×4 10 Lorries 7-10 ton 10 Tipping 6-10 ton, 24 Transporters.
Ind Quarrying Coy	4	2	3	13	167	8				3				3		4	170	17		3		
Ind Forestry Coy	5		5	12	248	5		1		1			6			5	252	14		4		
Ind Well Boring Sec	5	3	1	6	83	6				5	3			4	3 (p)	5	66	27				(p) Lorries 3-ton for Trailers.
HQ Ind Mech Recn Engrs	52	1 (a)	1	5	39	9	1			2				5		53	34	9		1		
Ind „ „ Coy	5	4 (a)	3	4	189	22	3		1	2			2	2	4 (q)	8	185	25		3	3	(q) 4 Workshop.
Ind Print Sec		2		1	8	2										2	9					
HQ Ind Pipeline Optg Coy	4	3 (a)	3	24	191	11	3			3				1		4	197	24		8		
Ind „ „ Sec	1	1	1	10	92	5	1			1						1	95	9		4		
Ind Road Roller Sec	1		1	2	76	2				1		2		1		1	40	39				
Ind Docks Stores Sec	1	2		2	2	1										3						
Ind Oxy Acet Gen Unit	1			1	28	2										1						
Ind Special Sec	1			1	11											1	6	6				
Ind ESBD	9	17(a)		6	51	25			1							9		17				
Ind Eng Base Wkshop	7	3 (a)	4	12	211	37			1	1						14						
Ind Swk Erec Sec	2	6 (a)		1	6	5										8						
Ind Ropeway Sec	2	7 (a)	1	2	89	2	1					1	2		2 (r)	3	85	13		1		(r) 2 Workshop.

TABLE "B."

74. Sets of Tradesman's Tools carried by Units.

UNIT.	Blue Print Equipment.	Blacksmiths.	Bricklayers.	Brickmakers.	Carpenters.	Draughtsman & Surveyors.	Electricians.	Fitters.	Handymans.	Painters.	Plumbers.	Saddlers & Tex. Ref.	Sawyers.	Tinsmiths.	Troop Leaders Recce. Set.	Welders Elect.	Welders Oxy./Acet.	REMARKS.
HQ Ind Armd Div Engrs						1				1								
Ind Fd Sqn (Two)		2	2		2	1	1	1	3	1		1	1	2	4			
Ind Fd Pk Sqn (One)		3	2		3	1	2	4	3	2		1	1	2	4		2	
Total Ind Armd Div Engrs		7	6		7	4	1	6	9	5		3	3	6	12		2	
HQ Ind Div Engrs						1	1			1								
Ind Fd Coy (Three)		2	2		2	1	2	2	3	2		1	1	2	4			
Ind Fd Pk Coy (One)		3	3		3	1	3	3	3	3		2	1	3	2		2	
Ind Bridging Sec (One)							1											
Total Ind. Div Engrs		9	9		9	5	11	9	12	10		5	4	9	14		2	
HQ Ind Lt Div Engrs						1												
Ind Lt Fd Coy (Two)		2	2		2	1	2	2	3	2		1	1	2	4			
Ind Lt Fd Pk Coy (One)		3	3		3	1	3	3	3	3		2	1	3	2		2	
Total Ind Lt Div Engrs		7	7		7	4	7	7	9	7		4	3	7	10		2	
HQ Fwd Airfields Engrs					1	2				1								
Ind Fd Coy (Two)		2	2		2	1	2	2	3	2		1	1	2	4			
Ind Engrs Bn (One)		8	12		12	4	4	5	9	4		5	8	4	5			
Total Fwd Airfield Engrs (Basic element)		12	16		17	8	8	9	15	9		7	10	8	13			
Ltd Indpt Fd Sec		2	1		2	1	1	1	1	1		1	1	1	1			
Ind Parachute Sqn		1			1	1	1	2	4	1		1		1	1			D'mans only,
Indpt Fd Stores Sec									1									
HQ Ind Corps Tps Engrs	1				1	2				1								
Ind Engrs Bn		8	12		12	4		5	9			5	8	4	5			
HQ Ind Br Coy		3	1		3		1	3		2		1		1			1	
" " Sec (Mk V Pontoon)		3	1		1		1	3		1		1		1				
" " " (American Pontoon)		3	1		1		1	3		1		1		1				
" " " (Bailey Bridge)		3	1		1		1	3		1		1		1				
" " " (Bailey Pontoon)		3	1		1		1	3		1		1		1				
HQ Ind Army (or L of C) Tps Engrs						1												D'mans only,
Ind Workshop & Park Coy		8	3		11	3	3	10		5		2	3	3		1		2 D'mans.
Ind E & M Coy																		No Tool Sets,
Ind AW Coy		5	33	4	45	1	1	1		5	4	1	5	1				
Ind Army Troops Coy		6	10		14	5	7	9		6		2	6	5			1	
Ind CE/DCE Works	1					2												
HQ Ind CRE Works	1		1			1												
Ind Works Secs			1			1				1								
HQ Ind BD Coy																		No Tool Sets.
Ind BD Secs																		No Tool Sets.

NOTES :—1. The tools held by Indian Bridging Sections and S. & M. Companies do not consist of Standard Sets. See W.E.T. and E. & M. Companies.

2. B D. units have specialist tools the nature of which is secret.

3. The table does not include sets of tools provided with M.T.

TABLE "C."

75. Fieldworks Tools and Stores.

UNIT	Fieldwork Sets.	Anchors Earth.	Augers Earth 9 in.	Axes Felling.	Axes Hand.	Axes Pick 6½ lb.	Axes Pick 4½ lb.	Crowbars 4-17	Cutters Wire Folding.	Dahs.	Hooks Bill.	Mauls.	Post Picket 2½ ft.	Post Picket 5 ft.	Sandbags.	S. ws Cross-cut 4 ft.	Saws Cross-cut 5 ft.	Saws Hand 26 in.	Saws Ripping	Shovels Mk 1.	Shovels G. S.	Levels I. P. 9-5 in.	Levels Telescop 10 in.	Theodolites Transit 5 in. I. P.	REMARKS.
HQ Ind Armd Div Engrs				1		5															10				
Ind Fd Sqn (Two)	10	6	3	10	10	60		20	30		10				800	3		15	10		60				
Ind Fd Pk Sqn (One)	6	20	2	6	6	36	100	12	34	50	6	8	32	20	2000	3		12	6	36	200	1			
Total Ind Armd Div Engrs	26	32	8	27	26	161	100	52	94	50	26	8	32	20	3600	9		42	26	36	330	1			
HQ Ind Div Engrs				1		6															8				
Ind Fd Coy (Three)	13	6	1	13	13	78		26	39		13	14	16		300	3		18	13	78					
Ind Fd Pk Coy (One)	6	6	2	6	6	36	435	12	18		6	10			250	3		12	6	36	860	2			
Ind Bridging Sec (One)				2		6			2		2	12	32	36	200			3			6				
Total Ind Div Engrs	45	24	5	48	45	282	435	90	137		47	64	80	36	1350	12		69	45	270	874	2			
HQ Ind Lt Div Engrs				1		3															3	1			
Ind Lt Fd Coy (Two)	13	6	1	40	40	78		26	39		73	5	24	30	300	12		18	13	78					
Ind Lt Fd Pk Coy (One)	6	6	2	106	206	36	435	12	18	50	206				250	3		12	6	36	860	2			
Total Ind Lt Div Engrs	32	18	4	187	286	195	435	64	96	50	352	10	48	60	850	27		48	32	192	863	3			
HQ Fwd Airfields Engrs				1	1	10												1			10				
Ind Fd Coy Two	13	6	1	13	13	78		26	39		13	14	16		1300	3		18	13	78		2			
Ind Eng Bn (One)	13	8	4	17	17	382		62	39	45	13	14			100	9	8	34	13	382			1		
Total Fwd Airfield Engrs (Basicement)	39	20	6	44	44	548		114	117	45	39	42	32		700	15	8	71	39	533	10	4	1		
Ind Indpt Fd Sec	5	2	1	5	5	30		10	15	6	5	2			100	1		8	5	30					
Ind Parachute Sqn			8	16	16		52	16	32		16				1600	20		5	16	52					
Indpt Fd Stores Sec	1			1	1	6		4	3		1	2				1		2	1	6					
HQ Ind Corps Tps Engrs				1	1	10												1							
Ind Eng Bn	13	8	4	17	17	382		62	39	45	13	14			100	9	8	34	13	382			1		
HQ Ind Br. Coy				5	2	20			2		4							3			20				
„ „ Sec (Mk V Pontoon)		4		4	4	15		6				6		30				1			15				
„ „ „ (American Pontoon)				4	4	15		6				8						1			15				
„ „ „ (Bailey Bridge)			6	4	4	15		6				6						1			15				
„ „ „ (Bailey Pontoon)				4	4	15		6				14		16				1			15				
HQ Ind Army or L of C Tps Engrs																					5				
Ind Workshop and Park Coy	4			4	4	40		8	18		4	4						15	4	40					
Ind E & M Coy				14	13	78		26	39		13						1	7	13		78		1		
Ind AW Coy				10	10	10												45		10					
Ind Army Troops Coy.		12	2	36	36	90		12	18	60	20			8	300			14		90		1			
Ind CE/DCE Works				2		10															10			1	
HQ Ind CRE Works				1		2												1			2	2		1	
Ind Wks Sections				1		2												1			2			1	
HQ Ind BD Coy		16	1	2	2	20		6	2		2	4		22	1000		1	2	2		10				
Ind BD Secs		16	1	2	2	20		4	2		2	4		46	1000		1	2	2		10				

TABLE "D."

76. Blocks, Tackle, Cordage and S.W.R.

UNIT.	Blocks Metal Pulley Worm Gear 2 ton.	Blocks Metal Trav. D.W. 9"	Blocks Tackle G.S. 3" Double.	Blocks Tackle G.S. 3" Snatch.	Blocks Tackle G.S. 3" Treble.	Blocks Tackle G.S. 2 1/2" Double.	Blocks Tackle G.S. 2" Double.	Blocks Tackle G.S. 2" Snatch.	Blocks Tackle G.S. 2" Treble.	Blocks Tackle G.S. 1 1/2" Double.	Blocks Tackle G.S. 1 1/2" Snatch.	Blocks Tackle G.S. 1 1/2" Treble.	Blocks Tackle G.S. 1" Snatch.	Cordage Manila 1 in. (fms).	Cordage Manila 1 1/2 in. (fms).	Cordage Manila 2 in. (fms).	Cordage Manila 2 1/2 in. (fms).	Cordage Manila 3 in. (fms).	Rope Galvanised 1 in. (fms).	Rope Galvanised 1 1/2 in. (fms).	Rope Galvanised 2 in. (fms).	Tackles Dif 1 ton.	Tackles Dif 2 ton.	Tackles Dif 4 ton.	REMARKS.
HQ Ind Armd Div Engrs																									
Ind Fd Sqn (Two)			2	2	2													113	36	113					
Ind Fd Pk Sqn (One)	1	2	4	4	4	4	4						4(a)	100	203	792	800	226	300		100				(a) for Wire Rope.
Total Ind Armd Div Engrs	1	2	8	8	8	4	4						4	100	203	792	800	852	372	226	100				
HQ Ind Div Engrs																									
Ind Fd Coy (Three)			3	3	3										113			113	36						
Ind Fd Pk Coy (One)	2		2	2	2										226			226	36						
Ind Bridging Sec (One)		2				4	4						4(a)	100	90	932	800	400	200		100				(a) for Wire Rope.
Total Ind Div Engrs	2	2	11	11	11	4	4						4	100	655	932	800	965	344		100				
HQ Ind Lt Div Engrs																									
Ind Lt Fd Coy (Two)			3	3	3										113			113	36						
Ind Lt Fd Pk Coy (One)	2	2	4	4	4									100	226			522	36		170				
Total Ind Lt Div Engrs	2	2	10	10	10									100	452			748	108		170				
HQ Fwd Airfield Engrs																									
Ind Fd Coy (Two)	1		3	3	3										113			113	36						
Ind Eng Bn (One)			8	8	8										400			400							
Total Fwd Airfield Engrs (basic element)	2		14	14	14										626			626	72						
Ind Indpt Fd Sec			1	1	1										50			50	18						
Ind Parachute Sqn														800	800										
Indpt Fd Stores Sec																									
HQ Ind Corps Tps Engrs																									
Ind Eng Bn			8	8	8										480			400							
HQ Ind Br Coy																									
" " Sec (Mk V Pontoon)							8							480	704	80		1056			27				
" " " (American Pontoon)															800			2000		83	27				
" " " (Bailey Bridge)					4			2	4							262		200			27				
" " " (Bailey Pontoon)					8							8	160	1000			1864	100		27					
HQ Ind Army or L of C Tps Engrs																									
Ind Workshop & Park Coy			4				4								100	50		50				6	4	1	
Ind E & M Coy										6	3	6			120										
Ind A W Coy																									
Ind Army Troops Coy	2		8	10	8		2(a)	2(a)	2(a)						200			400	38		200				(a) for Wire Rope.
Ind C E/D C E Works																									
HQ Ind CRE Works																									
Ind Wks Sections																									
HQ Ind BD Coy			2	2	2									30	113			113	30				1	1	
Ind BD Secs			6	6										30	113			113	30				1		

TABLE "E."

UNIT	WIRING STORES								A/TANK AND A/PERSONNEL MINES										REMARKS
	Cutters Wire Folding	Hammers Sledge Straight Pane 7 lbs	Hammers Sledge Straight Pane 10 lbs	Pickets Angle Long	Tapes Tracing	Wire Barbed Coils	Wire Concer-tina Rolls		Mines A/T Mk IV	Mines A/T No. 75	Mines A/P No. 3						Mine Detectors		
HQ Ind Armd Div Engrs																			
Ind Fd Sqn (Two)	30		8		32					280							8		
Ind Fd Pk Sqn (One)	34		25	832	88	32	288		2000	2770							8		
Total Ind Armd Div Engrs	94		41	832	152	32	288		2000	3330							54*		*30 in Pool
2nd Line Armd Div Eng									NOT FIXED.										
HQ Ind Div Engrs																			
Ind Fd Coy (Three)	39		8		38												2		
Ind Fd Pk Coy (One)	18		9	208	24	8	72		880								10		
Ind Bridging Sec (One)	2	1	1																
Total Ind Div Engrs	137	1	34	208	138	8	72		880								46*		*30 in Pool
2nd Line A & MT Div Eng									9-tons - see para 76 (a)										
HQ Ind Lt Div Engrs																			
Ind Lt Fd Coy (Two)	39		8		38												2		
Ind Lt Fd Pk Coy (One)	18		9		24												10		
Total Ind Lt Div Engrs	96		15		108												44*		*30 in Pool
2nd Line Lt Div Eng									NOT FIXED.										
HQ Fwd Airfields Engrs																			
Ind Fd Coy (Two)	39		8		39												2		
Ind Eng Bn (One)	39	8	26		62														
Total Fwd Airfield Engrs (Basic element)	117	8	42		138												34*		*30 in Pool
Ind Indpt Fd Sec	15		4		14														
Ind Parachute Sqn	32		25		16				152		64								
Indpt Fd Stores Sec	3		2		6														
HQ Ind Corps Tps Engrs																			
Ind Eng Bn	39	8	26		62														
HQ Ind Br. Coy	2	3	3																
" " Sec (Mk V Pontoon)			5																
" " " (American Pontoon)			5																
" " " (Bailey Bridge)			5																
" " " (Bailey Pontoon)			5																
HQ Ind Army (or L of C) Tps Engrs																			
Ind Workshop and Park Coy	18		8		8														
Ind E & M Coy	39	6	2		26														
Ind AW Coy			5																
Ind Army Troops Coy	18		6		32														
Ind CE/DCE Works																			
HQ Ind CRE Works																			
Ind Wks Sections																			
HQ Ind BD Coy	2	2	1		4														
Ind BD Secs	2	2	1		4														

NOTE.—Scale of Mine Detectors (Other Arms)

Ind Motor Battalions	...	...	4
Ind Armd Div Rec Coy	...	...	2
Ind Tank Rec Coy	...	...	2
Ind Div Recce Units	...	...	2

TABLE "F."

UNIT.	DEMOLITION EQUIPMENT.									EXPLOSIVES.											REMARKS.
	Auxiliary Cratering Equipment.	Cable Electric.	Camouflet Sets Heavy.	Camouflet Sets Light.	Camouflet Sets Light Special.	Camouflet Sets Points.	Camouflet Sets Tubes.	Exploders Dynamo.	Tests Sets Demolitions.	Ammonal, lbs.	Detonators No. 27.	Detonators No. 33.	Explosives "808," lbs.	Fuze Instantaneous, ft.	Fuze Primacord or Cordtex, ft.	Fuze Safety, ft.	Gun cotton Dry Primers.	Gun cotton Wet Slab or Exp. 808, lbs.	Incendiaries Pocket Time.	Matches Fuze, boxes.	
HQ Ind Armd Div Engrs																					
Ind Fd Sqn (Two)		1320	3			90	12	10	10	150	600	600		600	2500	1152	1080	1218	60	72	
Ind Fd Pk Sqn (One)	4	1320	4			120	16	2	2												
Total Ind Armd Div Engrs	4	3960	10			300	40	22	22	300	1200	1200		1200	5000	2304	2160	2436	120	144	
2nd Line Armd Div Eng		23980				300	40			975	1800	1200	660	3300	8500	3072	2820	2436	120	144	
HQ Ind Div Engrs																					
Ind Fd Coy (Three)		2640		3		90	12	9	9	150	300	300		600	2500	1152	720	672	60	72	
Ind Fd Pk Coy (One)	4	2640	6			180	24	4	2	50	300	100	1000		2500	1152	240	224		36	
Ind Bridging Sec (One)																					
Total Ind. Div Engrs	4	10560	6	9		450	60	31	29	500	1200	1000	1000	1800	10000	4608	2400	2240	180	252	
2nd Line A & MT Div Eng		39560				450	60			1500	2200	1000	2000	4800	15000	5750	3360	2240	180	252	
HQ Ind Lt Div Engrs																					
Ind Lt Fd Coy (Two)		2640		3		90	12	9	9	150	300	300		600	2500	1152	720	672	60	72	
Ind Lt Fd Pk Coy (One)	4	2640	6			180	24	4	2	50	300	100	1000		2500	1152	240	224		36	
Total Ind Lt Div Engrs	4	7920	6	6		360	48	22	20	350	900	700	1000	1200	7500	3456	1680	1568	120	180	
2nd Line Lt Div Eng		27920				360	48			1025	1500	700	1660	3300	11000	4124	2340	1568	120	180	
HQ Fwd Airfields Engrs								9	9	150	300	300		600	2500	1152	720				
Ind Fd Coy (Two)		2640	1	3		120	16											672	60	72	
Ind Engrs Bn (One)		2640						4	4	2016	800	400			2000	5376	1680	896		384	
Total Fwd Airfield Engrs (Basic element)		7920	2	6		240	32	22	22	2316	1400	1000		1200	7000	7680	3120	2240	120	528	
Ind Indpt Fd Sec		800		1	4	30	4	3	3	50	100	100			800	288	240	224		40	
Ind Parachute Sqn						120	16			2880			3300	1800	4800	3456	3240	700	600	64	
Indpt Fd Stores Sec																					
HQ Ind Corps Tps Engrs																					
Ind Engrs Bn		2640						4	4	2016	800	400			2000	5376	1680	896		384	
HQ Ind Br Coy																					
" " Sec (Mk V Pontoon)																					
" " " (American Pontoon)																					
" " " (Bailey Bridge)																					
" " " (Bailey Pontoon)																					
HQ Ind Army (or L of C) Tps Engrs																					
Ind Workshop & Park Coy		500						1	3		100	100				144	50	50			
Ind E & M Coy		500						1	1		100	100				144	50	50		10	
Ind AW Coy		800						2	1		125	125				240	56	56		10	
Ind Army Troops Coy		2000						5	5												
Ind CE/DCE Works																					
HQ Ind CRE Works																					
Ind Works Secs																					
HQ Ind BD Coy		600						2	2	126	200	200			1400	432	50	56		12	
Ind BD Secs		600						2	2	126	200	200			1400	432	50	56		12	

NOTE:—Camouflet set Heavy and Light is being replaced by Camouflet Equipment Mk. I.

TABLE "G."

UNIT	BEEHIVES, DEMOLITION ACCESSORIES, BOOBY TRAP STORES																			REMARKS
	Beehives	Compound Sealing, tins	Crimpers No. 6	Crimpers Tube Sealing Fuze	Fabric rubberized sq yds	Fuzetime lead break or fuze time pencil	Igniters Percussion	Igniters Striking copper tube	Lessolastic Coils	Mechanisms Pull	Mechanisms Push	Mechanisms Release	Sheaths Rubber	Tape Adhesive Khaki or Surgical, tins	Tape Insulating lbs.	Tape rubber pure lbs.	Trap Wire yds.	Trip Wire yds.	Tubes Fuze Sealing	
HQ Ind Armd Div Engrs																				
Ind Fd Sqn (Two)	24	12	6	10	5	120	30	300	2	30	30	30	108	100	10	.5	600	600	600	
Ind Fd Pk Sqn (One)				2											11		600	600		
Total Ind Armd Div Engrs	48	24	12	22	10	240	60	600	4	60	60	60	216	200	31	1	1800	1800	1200	
2nd Line Armd Div Eng	48	24	12	22	10	840	260	600	4	200	200	200	540	200	31	1	5330	2500	1200	
HQ Ind Div Engrs																				
Ind Fd Coy (Three)	24	12	6	9	5	60	30	300	2	30	30	30	108	100	9.5	.5	600	600	600	
Ind Fd Pk Coy (One)	72			2			10								12	.75				
Ind Bridging Sec (One)																				
Total Ind. Div Engrs	144	36	18	29	15	180	100	900	6	90	90	90	324	300	40.5	2.25	1800	1800	1800	
2nd Line A & MT Div Eng	144	36	18	29	15	1080	300	900	6	290	290	290	824	300	40.5	2.25	6800	13800	1800	
HQ Ind Lt Div Engrs																				
Ind Lt Fd Coy (Two)	24	12	6	9	5	60	30	300	2	30	30	30	108	100	9.5	.5	600	600	600	
Ind Lt Fd Pk Coy (One)	72			2			10								12	.75				
Total Ind Lt Div Engrs	120	24	12	20	10	120	70	600	4	60	60	60	216	200	31	1.75	1200	1200	1200	
2nd Line Lt Div Eng	120	24	12	20	10	720	270	600	4	200	200	200	540	200	31	1.75	4700	9200	600	
HQ Fwd Airfields Engrs																				
Ind Fd Coy (Two)	24	12	6	9	5	60	30	300	2	30	30	30	108	160	9.5	.5	600	600	600	
Ind Engrs Bn (One)				4			40	400							2					
Total Fwd Airfield Engrs (basic element)	48	24	12	22	10	120	100	1000	4	60	60	60	216	200	21	1	1200	1200	1200	
Ind Indpt Fd Sec		4	3	3	2	16	10	100	1	8	8	8	36	100	3.5		200	100	400	
Ind Parachute Sqn	64	16	4	4	16	80	600	300	16	128	96	128	108	1600			800	800	800	
Indpt Fd Stores Sec																				
HQ Ind Corps Tps Engrs				4			40	400							2					
Ind Engrs Bn																				
HQ Ind Br Coy																				
" " Sec (Mk V Pontoon)																				
" " " (American Ponton)																				
" " " (Bailey Bridge)																				
" " " (Bailey Pontoon)																				
HQ Ind Army (or L of C) Tps Engrs																				
Ind Workshop & Park Coy				3											1.5					
Ind E & M Coy				1			10								.5					
Ind AW Coy				1											.5					
Ind Army Troops Coy				5											2.5					
Ind CE/DCE Works																				
HQ Ind CRE Works																				
Ind Works Secs																				
HQ Ind BD Coy				2			30								1					
Ind BD Secs				2			30								1					

NOTE.—(i) The figures given for—
 Crimpers tube sealing fuze, Tape insulating include
 quantities held in Test Sets Demolition
i.e. 1 Crimper }
 ½ lb. tape insulating } per test set

NOTE.—(ii) Quantities of—
 Tape insulating
 Tape rubber pure
 included in tradesmens' tools sets, are NOT
 included in the above figures

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TABLE "H."
Water Supply Equipment.

UNIT.	Pumping Set No. 4	INCLUDED IN PUMPING SET NO 4						Pumping Set No. 5	Pumps Jaeger	Pumps L & F Mk VI E	Pumps Water portable	Fire Fighting Equipment Sets	Cisterns Water canvas 'S' type 1350 gall	Cisterns Water canvas 'S' type 500 gall	Cisterns Water canvass 50 gall	Cisterns Mule 6 gall	Troughs Canvas 350 gall	Hose Canvas 2 in x 30 ft	Hose Water Armoured 2 in x 12 ft					REMARKS
		Centrifugal Pumps	Drives Flex 17.5 mm ft.	Drives Flex 22 mm ft.	Engines Petrol 8 BHP	Well Head Gear Sets																		
HQ Ind Armd Div Engrs																1								For Pumps Pneumatic see Table "K"
Ind Fd Sqn (Two)	3	6	144	36	3				2				4		4	6		10	10					
Ind Fd Pk Sqn (One)	4	8	192	80	6	4			4						5	8		16	16					
Total Ind Armd Div Engrs	10	20	480	152	12	4			8				8		13	21		35	36					
HQ Ind Div Engrs																1								
Ind Fd Coy (Three)	2	4	96	24	2	2	3		4				5		4	6	4	30	12					
Ind Fd Pk Coy (One)	2	4	96	24	2	2	2		2				4		4	6		16	6					
Ind Bridging Sec (One)				32	8				1					2		2		2	5					
Total Ind. Div Engrs	8	16	384	128	10	8	11		15				19	2	16	27	12	108	47					
HQ Ind Lt Div Engrs																								
Ind Lt Fd Coy (Two)	2	4	96	24	2	2	3		4				6		4	6	6	30	12					
Ind Lt Fd Pk Coy (One)	2	4	96	24	2	2	2		4				4		4	6		20	10					
Total Ind Lt Div Engrs	6	12	288	72	6	6	8		12				16		12	18	12	80	34					
HQ Fwd Airfields Engrs																2								
Ind Fd Coy (Two)	2	4	96	24	2	2	3		4				5		4	6	4	30	12					
Ind Engrs Bn (One)							2		4				2		4	18		8	16					
Total Fwd Airfield Engrs (Basic element)	4	8	192	48	4	4	8		12				12		12	32	8	68	40					
Ltd Indpt Fd Sec	1	2	48	12	1	1	1		1				2		2	2		2	2					
Ind Parachute Sqn															4	20								
Indpt Fd Stores Sec																1								
HQ Ind Corps Tps Engrs																2								
Ind Engrs Bn							2		4				2		4	18		8	16					
HQ Ind Br Coy																								
" " Sec (Mk V Pontoon)		2	8	44	3							1						6	1					
" " " (American Ponton)		2	8	12	1						2	1						6	1*					
" " " (Bailey Bridge)																								
" " " (Bailey Pontoon)		2	8	76	5							1						6	1					
HQ Ind Army (or L of C) Tps Engrs																								
Ind Workshop & Park Coy	2	4	96	24	2	2			1					1	4	12		2	2					
Ind E & M Coy								3							4	6								
Ind AW Coy									2						5	10		2	4					
Ind Army Troops Coy	2	4	96	24	2				4				1	1	4	12		4	8					
Ind CE/DCE Works																1								
HQ Ind CRE Works																1								
Ind Works Secs																2								
HQ Ind BD Coy	1	2	48	12	1				3						2	2		6	4					
Ind BD Secs	1	2	48	12	1				3						2	2		6	4					

NOTE.—(i) Ind Bridge Sections () hold
1 Engine Petrol 8 BHP for Fire Fighting

NOTE.—(ii) Units on pack have—
Pumps Light weight (Pumps Jaeger 1½ HP) issued in lieu of Pumping Set No 5
Pumps Light weight Pumps L & F Mk V) issued in lieu of Pumps L & F Mk VI

TABLE "I"

UNIT.	WORKSHOP EQUIPMENT, LIGHTING SETS, WIRELESS SETS.																				REMARKS.
	Anvils 13½ lbs.	Anvils ½ cwt.	Anvils 1½ cwt.	Forges Field Heavy	Forges Field Light	Forges Portable	Lathe Screw cutting 6½" or 7"	Machine Drilling Portable.	Machine Drilling Radial.	Machine Grinding	Machine Sawing Circular.	Plants Welding & cutting HP AO/Heavy Wt.	Plants Welding Elec D C M/D 400/440 A.C.	Plants Welding Elec Portable.			Generating Set 4 K.W.	Lighting Set Mobile.	Wireless Set No. 22.	Wireless Set No. 536.	
HQ Ind Armd Div Engrs			3	3																	
Ind Fd Sqn (Two)			4	3		1	1	1	1	1	1	2					1	1			
Ind Fd Pk Sqn (One)																					
Total Ind Armd Div Engrs			10	9		1	1	1	1	1	1	2					1	1			
HQ Ind Div Engrs																					
Ind Fd Coy (Three)		3	1	1	3														3		
Ind Fd Pk Coy (One)			4	3		1	1	1	1	1	1	2					2	2	3		
Ind Bridging Sec (One)			2	2																	
Total Ind. Div Engrs		9	9	8	9	1	1	1	1	1	1	2					2	2	12		
HQ Ind Lt Div Engrs																					
Ind Lt Fd Coy (Two)		3	1	1	3														3		
Ind Lt Fd Pk Coy (One)			4	3		1	1	1	1	1	1	2							3		
Total Ind Lt Div Engrs		6	6	5	6	1	1	1	1	1	1	2							9		
HQ Fwd Airfields Engrs																					
Ind Fd Coy (Two)		3	1	1	3							1							3		
Ind Engrs Bn (One)		8	1	1	8																
Total Fwd Airfield Engrs (Basic element)		14	3	3	14							2							6		
Ind Indpt Fd Sec		2			2																
Ind Parachute Sqn																				24	
Indpt Fd Stores Sec																					
HQ Ind Corps Tps Engrs																					
Ind Engrs Bn		8	1	1	8																
HQ Ind Br Coy			2	3																4	
„ „ Sec (Mk V Pontoon)			1	1								1									
„ „ „ (American Ponton)			1	1																	
„ „ „ (Bailey Bridge)			1	1																	
„ „ „ (Bailey Pontoon)			1	1																	
HQ Ind Army (or L of C) Tps Engrs																					
Ind Workshop & Park Coy			10	8		2	2	2	2	2	2	1	1								
Ind E & M Coy	1	3	4	6		3	3	3	3	3	3	1		1							
Ind AW Coy		5			5																
Ind Army Troops Coy		4	4	2	4	2	2	2	2	2	2	1									
Ind CE/DCE Works																					
HQ Ind CRE Works																					
Ind Works Secs																					
HQ Ind BD Coy		1		1																	
Ind BD Secs		1		1																	

See also Note (i).

NOTES.—(i) Special equipment of Workshop and Park Coy is shown in para 87

(ii) Wireless Set No. 536 is a "Walky Talky"

(iii) Wireless Set No. 22. The No. 11 set may be issued in lieu if No. 22 Set is not available

See also Note (i).

TABLE "J."

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78. Pipe and Screw Cutting Tools.

UNIT	Cutters "A" Pipes	Cutters "B" Pipes	Cutters "C" Pipes	Machine Pipe Grooving & Cutting 1/2"-2"	Machine Pipe Grooving & Cutting 2"-4"	Machines Screwing hand No 2	Machines Screwing hand No 4	Tools Screw Cutting Beaver	Tools Screw Cutting BA No 1	Tools Screw Cutting BA No 2	Tools Screw Cutting BSF No 1	Tools Screw Cutting BSF No 2	Tools Screw Cutting BSP No 1	Tools Screw Cutting BSP No 2	Tools Screw Cutting BSW No 1	Tools Screw Cutting BSW No 2	Tools Screw Cutting BSW No 3	Tools Screw Cutting SAE Am Nat Fine	Tools Screw Cutting USS Am Nat Con	REMARKS
HQ 1st Armd Div Engrs																				
Ind Fd Sqn (Two)										1										
Ind Fd Pk Sqn (One)	2		2		1		1			1	2+	2+	3+	2	2	2	2			† One included in W/shop lorry
Total Ind Armd Div Engrs	2		2		1		1			3	2	2	3	2	2	2	2			
HQ Ind Div Engrs																				
Ind Fd Coy (Three)										1										
Ind Fd Pk Coy (One)	3		3				1			1	2+	2+	4+	3	3	3	1			† One included in W/shop lorry
Ind Bridging Sec (One)															1	1				
Total Ind Div Engrs	3		3				1			4	2	2	4	3	4	4	1			
HQ Ind Lt Div Engrs																				
Ind Lt Fd Coy (Two)										1										
Ind Lt Fd Pk Coy (One)	3		3				1			1	2+	2+	4+	3	3	3	1			† One included in W/shop lorry
Total Ind Lt Div Engrs	3		3				1			3	2	2	4	3	3	3	1			
HQ Fwd Airfields Engrs																				
Ind Fd Coy (Two)	1		1							1			1	1	1	1				Fd Coy in non-Div Role has additional pipe and screw cutting tools.
Ind Eng Bn (One)			2			1	1						1	1	1	1	1			
Total Fwd Airfield Engrs (Basic element)	2		4			1	1			2			3	3	3	3	1			
Ind Indpt Fd Sec	1		1							1			1	1	1	1				
Ind Parachute Sqn																				
Indpt Fd Stores Sec																				
HQ Ind Corps Tps Engrs																				
Ind Eng Bn			2			1	1						1	1	1	1	1			
HQ Ind Br. Coy											1	1			1	1				
" " Sec (Mk V Pontoon)											1	1			1	1				
" " " (American Ponton)											1	1			1	1		1	1	
" " " (Bailey Bridge)											1	1			1	1				
" " " (Bailey Pontoon)											1	1			1	1				
HQ Ind Army (or L of C) Tps Engrs																				
Ind Workshop and Park Coy										3	5+	5+	2+		3	3	3			† Two included in W/shop lorries
Ind E & M Coy	2	1		2	2			1	2	2	3+	3+	5+	2	1	2				† Three included in W/shop lorries
Ind AW Coy																				
Ind Army Troops Coy.						1	1			3	5+	5+	5+	3	3	3	3			† Two included in W/shop lorries
Ind CE/DCE Works																				
HQ Ind CRE Works																				
Ind Wks Sections																				
HQ Ind BD Coy															1					
Ind BD Secs															1					

NOTE:—(i)

Machine Screw Cutting hand

No 2 Pipe 1/4"-2" Bolt 1/4"-1"

No 4 Pipe 1/2"-4" Bolt 1/4"-2"

NOTE:—(ii)

Tools Screw Cutting

BSF No 1 1/4"-1/2"

No 2 5/8"-1"

BSP No 1 1/8"-3/4"

No 2 1"-2"

BSW No 1 1/4"-1/2"

No 2 5/8"-1"

No 3 1 1/8"-1 1/4"

TABLE "K"

UNIT.	PNEUMATIC EQUIPMENT AND WARSOP DRILL.																							REMARKS.
	Compressor Truck 15 cwt. T.S. 8	Breakers Concrete	Breakers Con- crete Picks Steel	Drill Hammer.	Drill Hammer Bits Det. 1½"	Drill Hammer Bits Det. 1½"	Drill Hammer Bits Det. 2"	Drill Hammer Drill Stem 20"	Drill Hammer Drill Stem 40"	Drill Hammer Drill Stem 60"	Drill Hammer Drill Stem 72"	Earth Boring Equipment Sets	Machine Woodboring.	Machine Woodboring Augers.	Picks Light.	Picks Light. Spades.	Picks Light Steel Chisel Pointed	Picks Light Steel Pick Pointed	Pumps Pneumatic.	Saws Pneumatic.	Hose Pneumatic ¾" x 50' W/Con- nectors	Warsop Rock Drill	Homelite Port. Compressor.	
HQ Ind Armd Div Engrs	3	3	6	6	150	150	150	6	6	6	6	3	3	72	6	12	6	6	1		18			
Ind Fd Sqn (Two)	2	2	4	4	100	100	100	4	4	4	4	2	2	48	4	8	4	4	2	2	12	4	4	
Ind Fd Pk Sqn (One)	2	2	4	4	100	100	100	4	4	4	4	2	2	48	4	8	4	4	2	2	12	4	4	
Total Ind Armd Div Engrs	8	8	16	16	400	400	400	16	16	16	16	8	8	192	16	32	16	16	4	8	48	4	4	
HQ Ind Div Engrs																								
Ind Fd Coy (Three)	1	1	2	2	50	50	50	2	2	2	2	1	1	24	2	4	2	2	1	1	6	1	1	
Ind Fd Pk Coy (One)	4	4	8	8	200	200	200	8	8	8	8	4	4	96	8	16	8	8	2	4	24			
Ind Bridging Sec (One)																								
Total Ind Div Engrs	7	7	14	14	350	350	350	14	14	14	14	7	7	168	14	28	14	14	5	7	42	3	3	
HQ Ind Lt Div Engrs																								
Ind Lt Fd Coy (Two)	1	1	2	2	50	50	50	2	2	2	2	1	1	24	2	4	2	2	1	1	6	1	1	
Ind Lt Fd Pk Coy (One)	2	2	4	4	100	100	100	4	4	4	4	2	2	48	4	8	4	4	2	2	12			
Total Ind Lt Div Engrs	4	4	8	8	200	200	200	8	8	8	8	4	4	96	8	16	8	8	4	4	24	2	2	
HQ Fwd Airfields Engrs																								
Ind Fd Coy (Two)	3	3	6	6	150	150	150	6	6	6	6	1	3	72	6	12	6	6	1	3	18	1	1	
Ind Eng Bn (One)	4	4	8	8	200	200	200	8	8	8	8	4	4	96	8	16	8	8	4	4	24			
Total Fwd Airfield Engrs (Basic element)	10	10	20	20	500	500	500	20	20	20	20	6	10	240	20	40	20	20	6	10	60	2	2	
Ind Indpt Fd Sec	1	1	2	2	50	50	50	2	2	2	2	1	1	24	2	4	2	2	1	1	6	1	1	
Ind Parachute Sqn																								
Indpt Fd Stores Sec																								
HQ Ind Corps Tps Engrs																								
Ind Eng Bn	4	4	8	8	200	200	200	8	8	8	8	4	4	96	8	16	8	8	4	4	24			
HQ Ind Br. Coy																								
" " Sec (Mk V Pontoon)																								
" " " (American Ponton)																								
" " " (Bailey Bridge)																								
" " " (Bailey Pontoon)																								
HQ Ind Army (or L of C) Tps Engrs																								
Ind Workshop and Park Coy																						1	1	
Ind E & M Coy																						1	1	
Ind AW Coy																						1	1	
Ind Army Troops Coy.	2	2	4	4	100	100	100	4	4	4	4	2	2	48	4	8	4	4	2	2	12			
Ind CE/DCE Works																								
HQ Ind CRE Works																								
Ind Wks Sections																								
HQ Ind BD Coy																								
Ind BD Secs																								

NOTE.—(i) For composition of compressor truck set, see para 91.

NOTE.—(ii) Scale of compressor truck:

Field Coy in Div role	...	1
Field Coy in non-Div role	...	3

